RAILROAD GAZETTE

FRIDAY, AUGUST 11.

Strong's Locomotive.

The engraving represents a method of constructing locomotives, patented by Mr. George S. Strong, of Philadelphia, which makes coupling rods unnecessary. The engraving shows the arrangement so clearly, that little description is needed. It will be seen that two cross-heads are used on each side of the engine, the two being connected together by horizontal bars, which are virtually extensions of the piston rods. The front cross-head is thus connected to the crank-pin of the front driving-wheel, and the back cross-head to the crank-pin of the back wheel.

The inventor expects soon to have this arrangement in use, which will decide its merits much more conclusively than any expression of opinion can now.

The inventor's address is corner of Seventh and Chestnut streets, Philadelphia.

Contributions.

The New Bridge at Albany.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Boston *Gazette* recently gave the following very complimentary notice of the new bridge at Albany, lately built by Clarke, Reeves & Co.:

"The marvelous rapidity with which such an extensive enterprise was carried to completion astonished the party, who could hardly credit the statement that work was commenced on June 1, 1881, and the bridge opened to travel on the 24th of January of the present year. The length of the new bridge to Charlestown would be about 400 ft., and the time estimated to complete it has been from three to four years, while the bridge at Albany, which is 1,600 ft. long, was finished in about seven months. The main river bridge is 900 ft. long, in three spans, consisting of two spans of 250 ft., with a draw-span of 400 ft. between them. The approaches on either side add 700 ft. to the length of the structure, making a total length of 1,600 ft. of iron work and masonry. The lower floor of the bridge is used for highway travel, and the upper section is designed to furnish accommodation for railroad traffic, provisions having been made for a double track, and the company in view is said to be the Boston, Hoosac Tunnel & Western. Some idea of the magnitude of the work may be formed from the draw-span, which contains nearly one thousand tons of iron, which, together with the weight of the flooring and the trusses, which are 50 ft. in hight along its whole distance, forms, it is said, the heaviest mass moving on a centre in the world. Yet so nice is the workmanship by which the draw is operated that six men can readily open it, although, to keep pace with the times, the motive power is furnished by a steam engine. As the party reached the bridge, preparations had been made to swing off the draw to permit the passage of a steamer, and there were exclamations of surprise when a draw 400 ft. in length—about the length of Quincy Market—was opened in two minutes. The system used to operate it is similar to that of the Broadway Bridge, but a very nice adjustment, so as to produce an even bearing at every point, facilitates the speed and prevents friction. From the bottom of the bridge to the water is 25 ft., so that canal boats, tugs, and other small craft can easily pass under it, but the draw has to be opened from fifty to sixty times each day for vessels that are too high to go under it."

The rapidity of its construction seems to have surprised the Boston *Gazette* men, and yet it was not so remarkable a feat as the construction of the Girard avenue bridge at Philadelphia—1,000 ft. long, 100 ft. wide and 55 ft. high, containing as much material as six railroad bridges of the same length—in fourteen months.

The statement that the Albany draw was as long as Quincy Market in Boston gives some idea of its great length, but not of its other dimensions. Single-track railway draws as long as this have been built, but this carries a double-track railway and a roadway 38 ft. wide.

When, as a Boston school-boy, I walked through Quincy Market, buying chestnuts, I never thought I should build a bridge as long and as high as that building.

JULY 28, 1882. T. C. CLARKE.

Notes By the Way—Train Indicators at Stations.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Considerable difficulty has been experienced since the opening of the Broad street station in Philadelphia, and since the transfer of the former Philadelphia, Wilmington & Baltimore station, in properly announcing so many trains. There are now 131 outgoing trains for each day (excepting Sunday), the termini of which are scattered near and far in all directions, so as to embrace practically a large portion of the country east of the Rockies. Moreover, where so many mistakes are possible, and so many persons, green to travel or to special routes, are relying upon the company to see them safely started as well as safely carried on their journey, the indication of trains is made a very serious matter.

There is no difficulty with regulars; they ask the road for nothing but seats; but the transient needs a care that is amusing in its iteration and reiteration of train times. It seems something beyond ordinary experience, for example, that an intelligent person with a carefully classified time-table should deliberately take the time of the arrival of the train at his destined station as its time for leaving Philadelphia. Yet this appears to be a not infrequent use of the time-table, while to many persons the ordinary time-table is of no use because they have no confidence in it. Then there are forgetful people, and people who take no note of time—nor of clocks. For such there is nothing that will serve but the train crier, and so a faithful one or two have been provided to visit all rooms.

Recently another means of train information—in fact, a "Bureau of Information"—has been opened. This concentrates the fire of questions upon one individual, who, from behind a pile of time-tables, maps and guides, is able to reply with direct and immediate attention to the various needs. It is probably the only bureau of the kind in the railroad world; and yet it is forced to write out routes in full, words often proving a delusion and a snare to the perplexed memory of green travelers. This suggests (to me) route blanks—which, no doubt, many an advertising road or firm would gladly supply.

The most important indicator of trains, however, is one which shall show at a glance the time and all way and terminal and important connecting stations of trains.

Such an indicator has just been completed. It was used for several divisions yesterday.

It consists of a large frame of oak (15 ft. by 10.6 ft. placed at the first landing of the staircase to the waiting rooms, where it is easily seen from the main room.

The method of operation gives infallible correctness, and that for all stations or points to the number of 80 for each outgoing train. Above are openings in the indicator face for announcing the time of a division train, its character and terminus. At these openings the proper words and figures appear in white on a blue ground. Under this upper section are 2 tiers of slats, 40 in each tier, each slat having an oak face and a reverse giving the name of a station or connecting terminal in white letters, also on a blue ground, after the standard of the road.

The slats are of a peculiar shape and are hung on points so that the natural centre of gravity requires the oak face of the slat to be exposed. When the reverse is exposed it is because of a rod pushing from below, and causing the slat to turn in a half-revolution. These rods are raised by a plate, worked by a wrench key. The plate is, however, perforated, and unless the perforations are covered, no rod is raised, and no slat shows its reverse.

By simply using a "Jacquard key," therefore—for the whole apparatus works upon the principle of the Jacquard loom—any combination of rods or any rod may be raised it is simply necessary to place upon the plate which lifts the rods a properly perforated card board—or "Jacquard key"—which may be prepared in the Superintendent's office, and is then constantly ready for use in announcing all the points of its train. Each card is, of course, stamped with the name and date and hour of its train, and does the same service in placing like announcements at the openings of the upper or train division of the indicator, as for the station announcement.

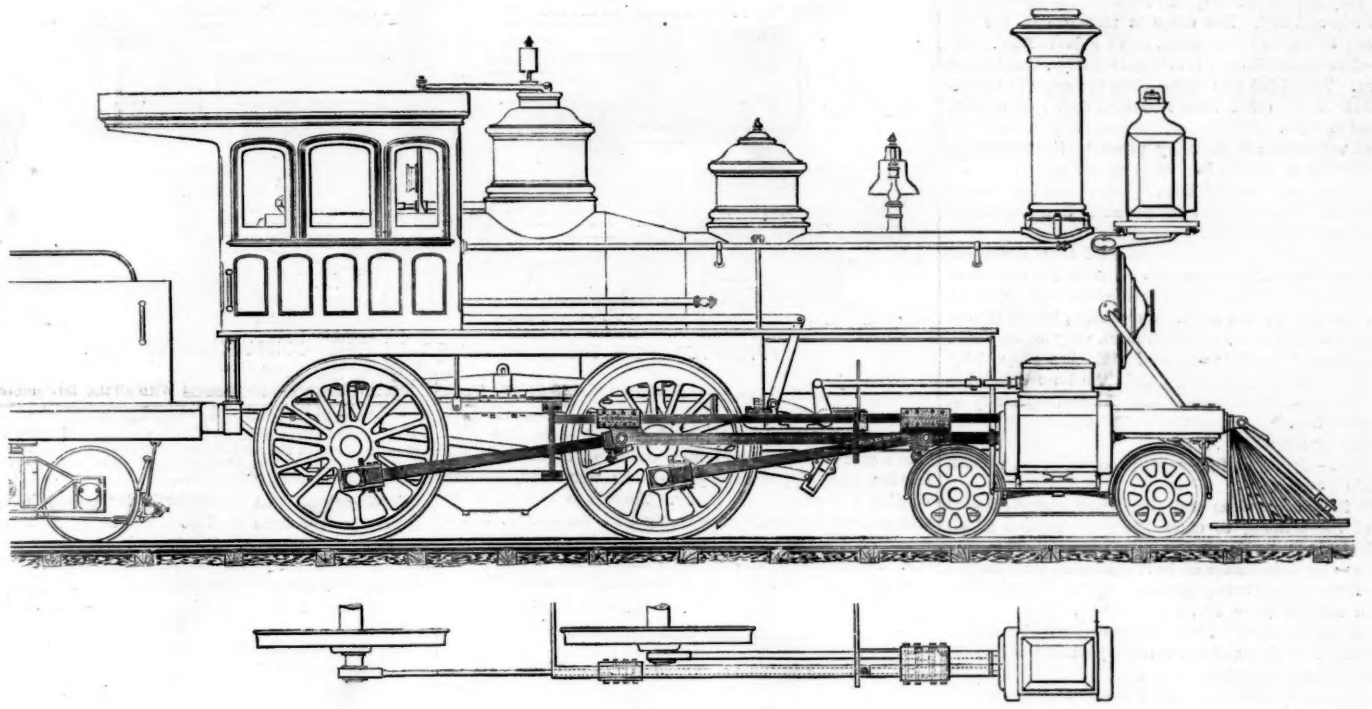
The Philadelphia, Wilmington & Baltimore's Central Division, including the West Chester & Philadelphia and Baltimore Central line, occupies one division of the indicator. The Pennsylvania Railroad Division occupies two divisions of the indicator, which thus provides for the announcement of 160 stations or connecting termini per train.

The New York Division occupies also two divisions and gives all north and east connecting terminal points. The Philadelphia, Wilmington & Baltimore's Maryland and Delaware line also occupies one division.

The indicator, designated the "magic station indicator," was invented by Mr. E. S. Boynton, of Bridgeport, Conn., an expert of the Wheeler & Wilson Manufacturing Co., to whom the Pennsylvania Railroad made application for such a device, giving a detailed statement of requirements. Mr. Boynton is the inventor of the "standard indicator (for stations). On permission of the road he fitted up the West Chester & Philadelphia cars and locomotives with this indicator, but the changes which have brought these car into the Broad street depot have completely curtailed the trail, since it is seldom that a West Chester train is made up of its own cars. A description of the indicator appeared in the *Railroad Gazette* some months since. It is very simple and appears to fulfill all conditions, after the outfit has once been placed. It is to be regretted that the trial was interrupted. It was in no sense whatever a failure, but was merely cut short by the necessary change of circumstances.

The Broad Street Station.—I have taken so much pleasure in studying the details of decoration of the Broad street station that I feel that I must say a few words about it.

The interior, as well as the exterior, as is widely known, is gothic in style, the walls remaining uncolored except by a map which covers the entire side of the main waiting-room. The ornament, therefore, would consist entirely of form, were it not for the broad sky-light of this room, the glass mildly tinted in gold, blue, green and red. No artificial color is so soft and beautiful, as well as full, as that coming through stained glass; and here it is used with great skill. Colored surfaces, if at all bright or strong, ask too much of the attention for a busy place; they are not necessary. But glass is necessary; and to color the necessary light by tasteful glazing of this sort, is to hit perfectly the conditions of the place. The effect is charming; and the whole building is a commentary on what Mr. Ruskin once wrote about the ornamentation of cars and stations. I was constantly wishing he might see this one. He thought people traveling too hurried and therefore too miserable to enjoy any sort of beauty or ornamentation; but the merry faces, especially of the ladies who comfortably rocked in their rocking chairs, seemed neither miserable nor even at all anxious to be called away. The rooms have a quite home-like appearance—the large fire-place, the curtains at the side, the rugs on the floor of the ladies sitting-room and one or two ornamental screens, together with the soft, broken lights from above,



STRONG'S LOCOMOTIVE.

make the illusion of the interior of a tastefully furnished home very pleasantly real. The entire station is not only a success; it is almost ideal in its completeness. The officers of the road have evidently taken a special interest in the entire building. X. Y. Z.

Papers on Painting.—No. 15.

BY CHARLES L. CONDIT.

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THE MYSTERIES OF OIL AND VARNISH.*

The use of drying oil has its mysteries as well as all other affairs of practical life, but the painter should be thoroughly impressed with the fact that observation, time and knowledge will unravel them all. The main thing is to look for general causes in particular ways (experiments); such general causes as, for instance, the influence of the atmosphere, mixtures of various unlike substances with each other, and want of honesty and fair dealing on the part of those who supply materials and those who use them. Too much stress must not be laid on this latter cause, especially not unless positive proof can be brought.

Mysteries Due to Atmospheric Causes.—Chill-cracking, that is, very fine cracks extending in all directions as though the varnish had begun to crystallize. Cure, *heat*.

Pin-holes.—Little holes as though made by a pin point; the cause, apparently, a chill when the varnish is fairly under way in hardening. No cure but heat and time.

Curdling.—Much like the curdling of milk. Cause, a chill to varnish to which coach japan has been added.

Crawling.—Due to a cold room, as it seldom, if ever, occurs in summer. The immediate cause is some oily matter on the surface. Rub surface with a damp shammy.

Clouding, Whitening.—A varnished surface toward a window may appear brilliant; the other side, away from the light, cloudy and dull. The cause is moisture in the air, which may be due to the weather, or to a damp floor. Example.—Two finished cars, rain for two days, varnish lost all lustre. The third day those sides toward the sun renewed their lustre, other sides remained dull and cloudy. Cure, heat or light.

Alcohol varnishes are specially prone to this difficulty, and should only be applied in a room heated to 70°.

Turning Blue.—A film of blue, in which one can write a name with the finger, covers the surface. Cause, coal-gas. Cure, more air and *sunlight*.

Mysteries Due to Unclean Surfaces.—All these are due to oil on the surface, either non-drying oil from the varnish or paint of surface, or from oil on the hand (as tool-oil), or oil from the oily skin of the hand. Carpenters, before the car is primed, painters and varnish-rubbers, may be at fault. An oily shammy is another cause of difficulty. Especially should the painter never forget that the human hand is always oily (from the oil-glands in the skin), especially so when it perspires.

Crawling (as above).

Small Pox.—Greasy surface-varnish, on which the varnish crawls into blotches.

Peeling in a mysterious and single spot (round), due to failure of the priming to enter the wood, because of oil (generally tool oil) previously taken up by the wood.

Rusting.—An appearance of having been under a stream of water from rusting iron; appears in spots. This may be due to a surface (of a car, for instance), which, at some time within several months, has been washed with lye water, to ashes blown against a car or a carriage, and wet by rain water; or, to ammonia-water or gas.

Blistering.—Oil on the surface by means as above stated. Too much Japan in colors, the shellac in the Japan the cause of the blistering. Wood not dry. Water left in a porous rough-stuff. Benzine in varnish or colors. Too great heat, as the concentration of sun heat in one spot by a "bull's-eye" in a glass of the shop window. Always the result of vapor or gas under the influence of heat.

Mysteries Due to the Painter.—Sagging Down.—The varnish appears in festoons or curtains. This is due to the use of too heavy a load of varnish on the brush and want of *courage* to spread it vigorously before it set. Also to carelessness. In paint, little streams appear, or brush marks, due to using too much paint and to mixing it too thick or too thin with turpentine.

Brushes.—Bits of pumice stone or dirt in varnish brushes will give a deal of trouble. But the danger is *in using English varnish with brushes which have not been kept in varnish.*

Varnish.—Using the last one-eighth of the can of varnish will give trouble. It should be kept for rough work.

Mysteries Due to the Manufacture and Quality of Varnish.—These are very difficult to come at. *Sweating* may be the fault of the varnish, because *possibly* oils other than linseed have been used, or because the insufficiently melted gum was not thoroughly incorporated with the oil.

Sweating, however, may be caused by the failure of the painter to allow varnish time before being rubbed. It may also be due to dampness in the atmosphere (perhaps). Also to old varnish which has become fatty—and in both cases the cause the same—presence of free oil acids. A London painter claims that a varnish which will bloom one day will do so the next. This is doubtful, but it is well to test in fair weather, to discover by way of proof.

"*Deadening,*" *or* "*Sinking in,*" *Change of Color, etc.*—Kauri gum, of which by far the greater part of varnish is made, quickly loses its lustre, although not necessarily its wearing power. This should not, however, occur for several months. If the dullness come immediately, it is probably not the fault of the varnish; or if it is, that fact can be positively proved by experiment with a remnant of the same lot if any remain.

The method of melting or making a solution of the gum (all gums) for the varnish may affect its lustre.

Prof. H. Schwarz, a German chemist, regards the green tinge in varnish is due to the action of the oxydized glycerine ether (acroline) of the oil affecting the copper of the vessel in which the varnish is made.*

The principal causes of immediate deadening and loss of lustre in good varnish, however, are to be looked for in two directions: (1) In the condition of the atmosphere. Moisture tends to separate the fine particles of gum from the dried oil. Gases dull the surface. (2) In the condition of the varnish. Test it on various surfaces. (3) Experiment with the varnish over a similar coat, if porous, putting the sample under strong heat for several hours, to see if the oil is driven in and taken up by the coats beneath, and lustre lost in this way. (4) Finally, as a cure, try the effects of heat and sunlight.

Perishing.—The varnish may lose lustre without perishing. Immediate or rapid perishing may be caused (1) by putting the surface under a hot summer sun *too soon.* Allow it plenty of air, but no excessive sun in summer for ten days. (2) The effects of ammonia vapor or water. (3) Varnish made of the cheaper gums. (4) The use of too much mangansee as drier in varnish or paint exposed to the sun's direct rays.

Mysterious Cases of Cracking.—As for instance, two cars painted and varnished at the same time in the same way. One cracks badly before it leaves the shop, the other remains perfect. Exclude first all causes of chilling from openings in the floor and other sources of draught. Then look out for unfairness on the part of some one—putting oil in some coat of the varnish to make it work easier, etc.

In a case like the above a man confessed to being so unfair and unmanly, because, perhaps, he was tired, and the varnish did not spread easily. There are always these temptations, especially in striping and varnishing, but a true man will not yield to them, nor will even a prudent one. No one either has a right to make such a charge except on a basis of facts. It is cowardly meanness to take advantage of one's position by charging unproved unfairness.

* It should be understood that these articles are the outcome of a partnership. Many statements are not to be credited to the writer, but to the long experience which has made these articles possible.

** One cause of this action is failure to keep the copper varnish kettles perfectly clean, especially the gum kettle. The copper may be detected in the melted varnish by a metallic lustre it gives to the surface. When discovered, says Prof. S., the copper should be reduced from the oil.

Gas Apparatus for Expanding Tires.

Mr. G. Lestang contributes to the *Revue Industrielle*, a description of a new apparatus, which we translate as follows:

"The use of gas for putting tires on iron wheel centres effects a noticeable economy; but for renewing them, the cost is nearly the same as by the older processes.

"The apparatus for using gas mixed with air for heating tires consists of a tube 1¼ in. in diameter surrounding the tire at a distance of 1 to 1½ in., and pierced throughout its interior circumference with little holes symmetrically disposed so that the flame escaping from them strikes the tire at three points of its height. Finally a tape connected at one point with this circular pipe receives from a reservoir placed at a certain distance a mixture of gas and air.

As is seen, this is a very simple way of heating, and its use is justified when putting on tires for obtaining an expansion a little in excess of one-thousandths of the diameter, and where the time required to reach that expansion can be utilized in the preparatory operations.

But the attempt made to apply it in removing tires are less easy to explain, since the problem is reversed, and it is then necessary to produce a high degree of heat in a relatively short time. All practical men who have seen this apparatus work understand that its feeble calorific power would be an obstacle to applying it generally in removing tires, because a slow transmission of heat would have as a consequence the heating of the wheel centre, and would delay the loosening of the tire in the same proportion as the process is long.

Experience has confirmed this; for if the operation has succeeded in a few isolated cases, and after more or less delay (usually 25 to 30 minutes), it has nevertheless often been necessary to cool the centre with water.

It is with regard to these considerations that the apparatus here described has been designed. But before entering upon the question, let us say a few words of the gas blow pipe-burner, which is the basis of the new apparatus.

The gas burner is composed of two converging cones, of which the central one, *A*, receives air at a fixed pressure; the outer one, *B*, conducts the gas necessary for the mixture. When the proportions of gas and air are well observed, the jet, burning but not illuminating, leaves the blue tint and reaches the rose tint within about 4 to 4¾ in., the point where there exists the highest temperature.

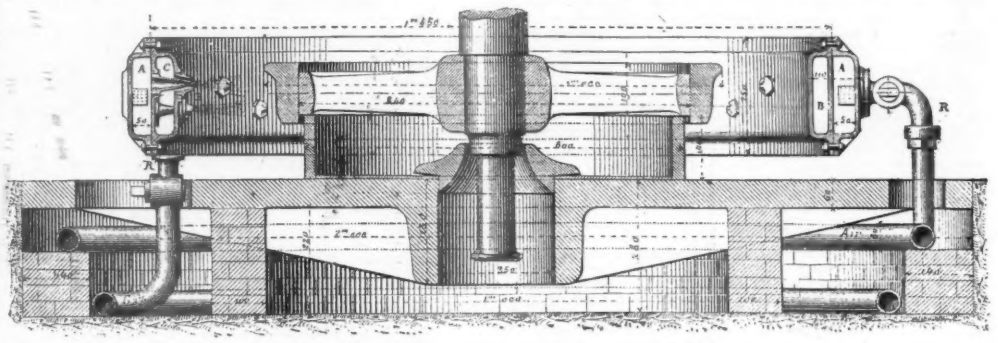
The chemical analysis of illuminating gas whose average composition is:

Hydrogen bicarbonate, $C^4 H^4$	9
Hyrogen protocarbonate, $C^2 H^4$	74
Oxide of carbon, $C O$	13
Carbonic acid and carburets in vapor	4
Total	100

This shows that it requires 7 litres of air for its complete transformation into carbonic acid.

It is then important for the performance of the new apparatus that the quantities of air and of gas introduced be in these proportions.

Let us examine the operation of the burners of the apparatus for removing tires, which includes two distinct rings. The outer one, *A*, receives the air at four points of its circumference by cocks, *R*, connected with a circular tube, 2 in. in diameter, which itself is fed by two channels. The second is the interior ring *B*, which receives the gas likewise at four points by cocks, *R'*, connected with another annular tube, of 2 in. diameter, and supplied at two opposite points with gas issuing from a meter under a pressure of 1½ in. of water. It will be understood that the cocks serve only to regulate the supply of gas and air for the 30 blow-pipe burners, *C*, which complete this apparatus.



APPARATUS FOR EXPANDING TIRES BY THE COMBUSTION OF GAS.

Observations made when this apparatus was working most favorably have given the following results:

Air pressure in the ring *A* (in height of column of water)	8.4 in.
Pressure of gas in the ring *B* (height of water)	0.3 "
Consumption of gas per minute, measured by the meter under a pressure of 3.2 in	.1 cubic meter

Simple calculations show that by increasing the diameter of the burners from 0.16 to 0.224 inch, and keeping the supply of gas the same, with a fan-blower, the necessary air can be furnished to the 30 burners, provided that this blower works under a minimum pressure of 5.6 in. and supplies two entire meters of air per minute—sufficient for two forge fires.

Now let us examine the apparatus for removing tires, with regard to its utilization of the heat.

Experience shows that a tire of 36 in. interior diameter, and weighing about 4.60 lbs., is raised to a temperature of 300° (= 572° Fahr.) in eight minutes.

In short, this apparatus is only a rational application of the gas blow-pipe, but has the advantage of giving out in a much shorter time the amount of heat necessary for a given expansion. By this means we believe there will be less waste and a greater useful effect; finally, the consumption of gas and air can be varied, and it therefore can be applied without distinction for putting on or taking off tires.

The simple and cheap construction of the gas-burner, the low cost of keeping it in order (almost nothing), and the ability to produce or extinguish instantaneously a fire, whose intensity can also be regulated, the regularity of the heat attained at all points on the tire, which is an essential matter for cast steel, are so many considerations in favor of its use for occasional work, and that which lasts but a short time.

Finally, the high temperature quickly obtained by this apparatus, by hastening the process, reduces the labor required, and so justifies its use even where, in certain cases, the cost of gas would be more than that incurred if coal were used.

Discrimination in Freight Rates Because of Quantity Shipped.

In the case of John Hays & Co. *vs.* the Pennsylvania Company, United States Circuit Court, Northern District of Ohio, June, 1882, Baxter, C. J., made the following decision:

The plaintiffs were, for several years next before the commencement of this suit, engaged in mining coal at Salineville, and near defendant's road, for sale in the Cleveland market. The were wholly dependent on the defendant for transportation. Their complaint is that the defendant discriminated against them, and in favor of their competitors in business, in the rates charged for carrying coal from Salineville to Cleveland. But the defendant traversed this allegation. The issue thus made was tried in the last term of the court, when it appeared in evidence that the defendant's regular price for carrying coal between the points mentioned in 1876, was $1 60 per ton, with a rebate of from 30 to 70 cents per ton to all persons or companies shipping

5,000 tons or more during the year—the amount being graduated by the quantity of freight furnished by each shipper. Under this schedule the plaintiffs were required to pay higher rates on the coal shipped by them than were exacted from other and rival parties who shipped larger quantities. But the defendant contended, if the discrimination was made in good faith, and for the purpose of stimulating production and increasing its tonnage, it was both reasonable and just, and within the discretion confided by law to every common carrier. The court, however, entertained the contrary opinion, and instructed the jury that the discrimination complained of and proven, as above stated, was contrary to law, and a wrong to plaintiffs, for which they were entitled to recover the damages resulting to them therefrom, to wit: The amount paid by the plaintiffs to the defendant for the transportation of their coal from Salineville to Cleveland (with interest thereon) in excess of the rates accorded by defendant to their most favored competitors. The jury, under these instructions, found for the plaintiffs and assessed their damages at $4,585. The defendant thereupon moved for a new trial, on the ground that the instructions given were erroneous, and this is the question we are now called on to decide. If the instructions are correct the defendant's motion must be overruled; otherwise, a new trial ought to be granted.

A reference to recognized elementary principles will aid in a correct solution of the problem. The defendant is a common carrier by rail. Its road, though owned by the corporation, was nevertheless constructed for public uses, and is, in a qualified sense, a public highway. Hence, everybody constituting a part of the public, for whose benefit it was authorized, is entitled to an equal and impartial participation in the use of the facilities it is capable of affording. Its ownership by the corporation is in trust as well for the public as for the shareholders; but its first and primary obligation is to the public. We need not recount all these obligations. It is enough for present purposes to say that the defendant has no right to make unreasonable and unjust discriminations. But what are such discriminations? No rule can be formulated with sufficient flexibility to apply to every case that may arise. It may, however, be said that it is only when the discrimination enures to the undue advantage of one man, in consequence of some injustice inflicted on another, that the law intervenes for the protection of the latter. Harmless discrimination may be indulged in. For instance, the carrying of one person, who is unable to pay fare, free, is no injustice to the other passengers who may be required to pay the reasonable and regular rates fixed by the company. Nor would the carrying of supplies at nominal rates to communities scourged by disease, or rendered destitute by floods or other casualty, entitle other communities to have their supplies carried at the same rate. It is the custom, we believe, for railroad companies to carry fertilizers and machinery for mining and manufacturing purposes along the lines of their respective roads, to develop the country and stimulate productions as a means of insuring a permanent increase of their business, at lower rates than are charged on other classes of freight, because such discrimination, while it tends to advance the interest of all, works no injustice to any one. Freight carried over long distances may also be carried at a reasonably less rate per mile than freight transported for shorter distances, simply because it costs less to perform the service. For the same reason passengers may be divided into different classes, and the price regulated in accordance with the accommodations furnished to each, because it costs less to carry an emigrant, with the accommodations furnished to that class, than it does to carry an occupant of a palace car. And for a like reason an inferior class of freight may be carried at a less rate than first-class merchandise of greater value and requiring more labor, care and responsibility in handling. It has been held that 20 separate parcels, done up in one package, and consigned to the same person, may be carried at a less rate per parcel than 20 parcels of the same character consigned to as many different persons at the same destination, because it is supposed that it costs less to receive and deliver one package containing 20 parcels to one man than it does to receive and deliver 20 different parcels to as many different consignees.

Such are some of the numerous illustrations of the rule that might be given. But neither of them is exactly like the case before us, either in its facts or principles involved. The case of Nicholson *vs.* G. W. R. Co., 4 C. B. (N. S.), 366, is in its facts more nearly like the case under consideration than any other case that we have been able to find. This was an application, under the railway and traffic act, for an injunction to restrain the railroad company from giving lower rates to the Ruabon Coal Company than were given to complainant in that case, in the shipment of coal, in which it appeared that there was a contract between the railroad company and the Ruabon Coal Company, whereby the coal company undertook to ship, for a period of 10 years, as much coal for a distance of at least 100 miles over defendant's road as would produce an annual gross revenue of £40,000 to the railroad company, in fully loaded trains at the rate of seven trains per week. In passing on these facts the Court said that in considering the question of undue preference the fair interest of the railroad company ought to be taken into the account; that the preference or prejudice, referred to by the statute, must be undue or unreasonable to be within the prohibition; and that, although it was manifest that the coal company had many and important advantages in carrying their coal on the railroad as against the complainant and other coal owners, still the question remained, were they undue or unreasonable advantages? And this, the Court said, mainly depended on the adequacy of the consideration given by the coal company to the railroad company for the advantages offered by the latter to the coal company. And because it appeared that the cost of carrying coal in fully-loaded trains, regularly furnished at the rate of seven trains per week, was less per ton to the railway company than coal delivered in the usual way, and at irregular intervals, and in unequal quantities, in connection with the coal company's undertaking to ship annually coal enough over the defendant's road, for at least a distance of 100 miles, to produce a gross revenue to the railroad of £40,000, the Court held that the discrimination complained of in the case was neither undue nor unreasonable, and therefore denied the application.

This case seems to have been well considered, and we have no disposition to question its authority. Future experience may possibly call for some modification of the principle therein announced. But *this case* calls for no such modification, inasmuch as the facts of that case are very different, when closely analyzed, from the facts proven in this one. In the former the company in whose favor the discrimination was made gave, in the judgment of the Court, an adequate consideration for the advantages conceded to it under and in virtue of its contract. It undertook to guarantee £40,000 worth of tonnage per year for 10 years to the railroad company, and to tender the same for shipment in fully loaded trains, at the rate of seven trains per week. It was in consideration of these obligations—which, in the judgment of the court, enabled the railroad company to perform the service at less expense—the Court held that the advantages secured by the contract to the coal company were neither undue nor unreasonable. But there were no such facts to be found in this case. There was, in this case, no undertaking by any one to furnish any specific quantity of freight at stated periods; nor was any one bound to tender coal for shipment in fully loaded trains. In these particulars the plaintiffs occupied common ground with the parties who obtained lower rates. Each tendered coal for transportation in the same condition and at such times as suited his or their convenience. The discrimination complained of rested exclusively on the amount of freight supplied by the respective shippers during the year. Ought a discrimination resting exclusively on such a basis to be sustained? If so, then the business of the country is, in some degree, subject to the will of the railroad officials; for, if any one man engaged in mining coal, and dependent on the same railroad for transportation to the same market, can obtain transportation thereof at from 25 to 50 cents per ton less than another competing with him in business, solely on the ground that he is able to furnish and does furnish the larger quantity for shipment, the small operator will sooner or later be forced to abandon the unequal contest and surrender to his more opulent rival. If the principle is sound in its application to rival parties engaged in mining coal, it is equally applicable to merchants, manufacturers, millers, dealers in lumber and grain, and to everybody else interested in any business requiring any considerable amount of transportation by rail; and it follows that the success of all such enterprises would depend as much on the favor of railroad officials as upon the energies and capacities of the parties prosecuting the same.

It is not difficult, with such a ruling, to forecast the consequences. The men who control railroads would be quick to appreciate the power with which such a holding would invest them, and it may be, not slow to make the most of their opportunities, and perhaps tempted to favor their friends to the detriment of their personal or political opponents; or demand a division of the profits realized from such collateral pursuits as could be favored or depressed by discriminations for or against them; or else, seeing the augmented power of capital, organize into overshadowing combinations, and extinguish all petty competition, monopolize business, and dictate the price of coal and every other commodity to consumers. We say these results *might* follow the exercise of such a right as is claimed for railroads in this case. But we think no such power exists in them; they have been authorized for the common benefit of every one, and cannot be lawfully manipulated for the advantage of any class at the expense of any other. Capital needs no such extraneous aid. It possesses inherent advantages which cannot be taken from it. But it has no just claim, by reason of its accumulated strength, to demand the use of the public highway of the country, constructed for the common benefit of all, on more favorable terms than are accorded to the humblest of the land; and a discrimination in favor of parties furnishing the largest quantity of freight, and solely on that ground, is a discrimination in favor of capital, and is contrary to a sound public policy, violative of that equality of right guaranteed to every citizen, and a wrong to the disfavored party, for which the courts are competent to give redress.

The motion, therefore, for a new trial will be denied, and a judgment entered on the verdict for the damages assessed and the costs of the suit.

Welker, D. J., concurred.

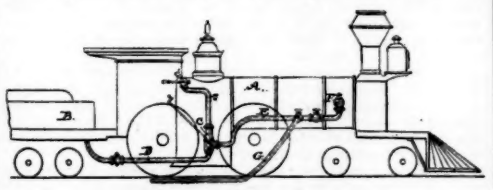


FIG. 1.

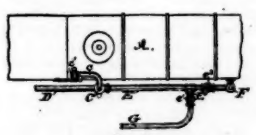


FIG. 2.

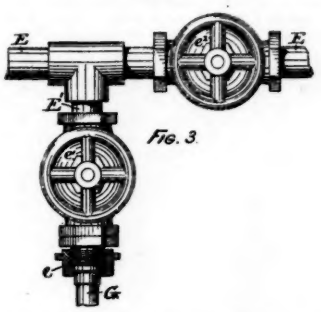


FIG. 3.

Apparatus for Extinguishing Fire on Trains.

Means for Extinguishing Fires on Railroad Trains.

Mr. Robert C. Blackall, Superintendent of Machinery of the Delaware & Hudson Canal Company, has recently patented an arrangement for utilizing the feed-water injector of the locomotive for the purpose of forcing the water contained in the tank of the tender through any necessary length of hose, and forcibly discharging it to extinguish fires in case of accidents to trains.

A tender filled or partly filled with water would, in most cases, when trains take fire after an accident, supply abundant means for putting out the fire, if only the water could be thrown on the flames. To do this Mr. Blackall has attached a pipe *G*, fig. 1, to the feed pipe between the injector and check-valve. A stop-cock or valve is placed between the point at which *G* is attached to the feed-pipe, and the check-valve *F*, for the purpose of closing the passage leading to the boiler and thus preventing the flow of water into the latter. When this is done it is obvious that, if the injector is started, water will be forced through the pipe *G*, and that it could be conducted from the latter by hose to any desired point. Fig. 2 is a plan showing the arrangement of pipes, and fig. 3 an enlarged view of the connections. The pipe *G* has a stop-cock *e'*, fig. 2, which, of course, is opened only when it is desirable to throw water on a fire.

When this device is used, it is proposed to supply each car with a sufficient quantity of hose to reach a distance equal to the length of the car.

An improvement which, it would seem, might be made, would be to connect the pipe *G* to the air brake pipe, and then, by simply attaching a short length of hose to the brake couplings, water could be thrown from the rear end of any car in the train, provided the brake connections in front of it had not been injured by the accident. A short length of hose with a suitable nozzle and with a brake coupling could be carried on the engine for this purpose, or the brake-hose themselves could be used for throwing water. This improvement is contributed by the *Railroad Gazette*, and is not patented at present that we know of.

Mr. Blackalls claims as his invention:

"The combination, with the boiler of a locomotive, of a feed-water injector, *C*, having a delivery-pipe, *E*, for connecting said injector with a check-valve, *F*, attached to said boiler, provided with a branch pipe, *E'*, and stop-valves e' and e^2, arranged as described, for the purpose of optionally discharging the entire volume of water passing through the injector, either into or outside of said boiler, or for dividing the volume of water in the manner and for the purposes herein specified."

MASTER MECHANICS' ASSOCIATION.

Reports and Discussions.

We contine our summary of the proceedings at the recent convention, giving this week Mr. Wells' excellent paper and a summary of the interesting discussion upon the same:

LOCOMOTIVE BOILER CONSTRUCTION.

(Report presented by Mr. Wells, Chairman of the Committee.)

Gentlemen: A meeting of the Committee on Boilers was called by the Chairman to meet in Louisville, Nov. 22, 1881, but owing to business engagements only Mr. Johann and the Chairman of the Committee were able to attend. After some correspondence with the different members, it was agreed that each should make his own report in such form as he saw proper.

The demands of business prevented me from giving the subject sufficient time during the past year to collect the data for a report, or the results of the tests and investigations made by others, and I forward this communication with the object of calling attention to a few points and eliciting discussion, rather than a report.

Reports have been made heretofore covering nearly or quite all matters pertaining to the subject of the best material, form and proportions for locomotive boilers, and there seems to be but little matter that has not already been brought to your notice in reports and the different points discussed.

As regards material in the construction of boilers, the use of the best quality of homogenous steel as now made by our manufacturers in this country leaves but little more to be desired. Yet nothwithstanding its excellent quality we are not entirely free from ruptured side sheets in the larger class of locomotive boilers where the box is deep and water used such as deposits a hard scale on the sheets. The fault in most cases of failure is not with the material, but rather that it is required to stand what in the nature of things may be said to be impossible—strains from compression and elongation beyond the elastic limit, without final rupture. That fire-box sheets under circumstances frequently occurring are subject to such strains was, I believe, conclusively demonstrated in a series of tests made by the writer and published in the tenth annual report. The formation on the sheet increases the expansion of the metal by allowing it to attain a higher temperature than it otherwise would, developing strains in the sheet that sometimes produce a permanent elongation or shortening, as the case may be, in a comparatively small section of the sheet, and when the temperature becomes uniform in all parts of the sheet, the part under tensile strain is liable to rupture, beginning always at a stay bolt hole, but extending through the sheet between the stay bolts, as likely when once started, as from one hole to another.

On some of the divisions of the roads with which I am connected a large number of engines have been in service more than ten years doing heavy work, and not 5 per cent. of the steel fire-box sheets in them have cracked during that time. The water used in these boilers is such that hardly any scale is formed on the sheets. More than 80 per cent. of these engines have their original fire-boxes, which are still sound and apparently good. On several other divisions the case is somewhat different, more particularly the St. Louis Division, north of the Ohio River through the state of Illinois, where the water used is more or less impure, in consequence reducing the life of the fire-boxes to about one-half of that in the case of engines on most of the divisions south of the river.

The character of the water used in a boiler as regards the deposits left in it from evaporation determines to a great extent the durability of the fire-box and tube ends. Yet with the best quality of water a fire-box has its day. It perishes however from a different disorder than the one in a boiler supplied with water that deposits a heavy scale; in the former case the flanges of the flue sheets and the back sheet from the top of the grate to about 36 in. up are the points that ordinarily give out first. The flanges become overheated or burned and crack from the rivet out, and the cracks gape open and leak. The sheets also become thin at the corners below the grate from corrosion, while in its other parts the fire-box remains sound.

In the latter case the life of the fire-box is too short for producing this effect on the flanges of flue and back sheets, as the side sheets give out at the stay-bolts from cracks extending from them to a greater or less distance, until renewal becomes necessary.

It is important in all cases that the flanges of fire-box sheets be as short as possible. The closer the seam is to the corner the longer it will last. It remains cooler than if more exposed to the effects of the fire. I have noticed a number of flue and back sheets within the past two years that had to be removed simply on account of the burning and cracking of their flanges, that were otherwise good for several years' service, and many more that must soon be removed from the same cause. The flanges were originally made too long, extending out from the face of the sheet as much as 3 in. Had they been but 2 in. they would doubtless have lasted much longer. This is a matter which from my observation I conclude is very often overlooked in the construction of the fire-box. All laps exposed to the fire should be as short as possible, more particularly where the heat is great; the flanges if properly turned need not at most be more than 2 in. from the face of the sheet in the vertical seams for a distance of two or three feet above the grate. A lap of 1¼

in. for the seam is sufficient at that place. At greater distances from the grate, the lap and length of flange may be greater without any evil results. I have noticed many cases also where tube sheets were much worn around the end of the tube in the form of a counter sink, about ¼ in. wide and the same in depth, around the lower and central tubes the sheets becoming so thin as to require removal, while at all other parts they were apparently good. Such sheets were in nearly or quite every case in fire-boxes of engines doing heavy work and having boilers comparatively small for their cylinders and work. In the case of copper tube sheets this defect seems to be greater even than with steel sheets.

The cause of this cutting away of the sheet in the form of a groove around the tube end is due, I suppose, to the particles of coal and cinders drawn towards the tube by the force of the draft, and those striking the outer slope of the head on the end of the tube, where it projects into the fire-box, turn outward toward or from the tube, striking the sheet, and in time cutting a groove or valley around the end of the tube as stated, while the projecting end of the tube itself suffers comparatively little, the action of these particles of coal and cinders on the sheet around the tube being the same as that of sand in the sand blast machines for sharpening files. If this theory is correct, then it will be best to have as little projection of the tube-end as possible beyond the face of the sheet in the fire-box. To countersink the tube hole sufficiently to receive the head or flange on the end of the tube without leaving a sloping projection on its outer edge will add to the life of the sheet.

In the matter of improvements in the designs of boilers and in their construction that is new and valuable, I have little or nothing to offer. What may seem to be new in these latter days is generally found to be some slight change in an old plan or pattern, or something long known to the public presented in a modified form.

The first successful locomotive boilers made were of the tubular pattern, the fire-box surrounded by a water space; and we are using the same form to-day, not having found a better one; and until some new method of generating power is discovered we may be obliged to continue the use of the present pattern without material alteration. The "Verderber" boiler, without water space around the fire-box, tried on several locomotives on one of the Hungarian state roads in Europe several years ago, seems to have been a failure as regards improvement on the common form of boiler for generating steam.

There may be in the economy of nature a "thus far shalt thou go and no farther" for a time at least, and until such time the wisest course will be to endeavor to perfect that which we have. That we have arrived at perfection in the construction of the locomotive boiler no well-informed person will, I think, assert: nor that some one class of boiler will answer best for all classes of engines, kinds of fuel and different qualities of water that must be used. The character of the water as regards the impurities held in solution in it; the quality of the fuel to be used, as regards its evaporative power, the grate area, the quantity to be evaporated in a given time, and the class of engine, must all be intelligently considered in fixing upon the form and proportions of the boiler in order to give the best results.

In illustration of the fact that the character of the coal to be used should be considered in proportioning the grate area of the fire-box, I will give the result of a series of tests made in the boiler of one of the passenger engines running on the Louisville & Nashville Railroad, between Louisville and Nashville, in the months of April and May, 1882, in testing the difference between seven different kinds of coal. The engine had 18 by 24-in. cylinders, 63-in. drivers, was an eight-wheeled engine, with a boiler 54 in. in diameter, the wagon-top raised 6 in. above the cylinder part and a 30-in. dome. The fire-box was 72 in. by 34 in. at the grate, 191 2-in. tubes, 11 ft. 5⅛ in. long. The fire-box was fitted with the brick arch supported on four water pipes, tapped into the sheet below the boiler tubes and into the crown sheet 13 in. from the back sheet; grate area, 12½ ft. (live grate); tube surface (inside diameter), 1,052 ft.; heating surface of fire-box, 115 ft.; total, 1,167 ft. (deducting for tube holes, fire-door and surface below the grate).

During these tests the engine was run and fired by the same men, the coal carefully weighed and the water accurately measured.

The average speed of the train, including stops, was 27 miles per hour, and the average number of cars per train was 67. The conditions under which the tests were made were as near alike as it was practicable to have them. Wood was used for firing up. The water was gauged when the first coal was put into the fire-box previous to starting on each trip.

	Eng. miles.	Evaporation of water to 1 lb. coal.
Coal No. 1	374	7.311 lbs.
" " 2	361	5.827 "
" " 3	374	6.402 "
" " 4	374	6.269 "
" " 5	374	5.393 "
" " 6	748	5.482 "
" " 7	561	6.327 "

The average temperature of water in tender was 65° Fah.; average steam pressure in boilers, 130 lbs. The total engine mileage was 3,366 miles, and the average evaporation was 6.002 lbs. to 1 lb. of coal consumed. Each trip or run was 187 miles.

Coal No. 1 was the best quality of Pittsburgh; No. 2 an inferior quality; No. 3, Alabama coal; No. 4, Tennessee coal from near Chattanooga. Nos. 5, 6 and 7 from mines in Central Kentucky. The difference in evaporation between the best and the poorest of these coals was 26 per cent. In other words, the poorest coal (No. 5) evaporated 26 per cent. less water to the lb. than the best coal (No. 1). To evaporate the same quantity of water in a given time, 26 per cent. more of the No. 5 coal must be burned than if the No. 1 were used; and if the grate area was the correct proportion for burning the best coal, it was too small for the poorest, and *vice versa*.

The train average in cars was the same in both cases and the speed the same, and the tests made going the same way (south); the differences in the results, therefore, were due to difference in the coal. This will serve to show that our monthly reports of the coal burned per mile and per car hauled are of no practical value for comparison except where the coal is of one quality.

Comparing the performance of an engine using coal No. 5 with one using coal No. 1 would be very unfavorable for the former, taking the quantity only into account. The boiler using that coal would be considered very inferior, or the one using No. 1 would be credited with merits not due to it if the quality of coal consumed was not considered. The whole difference being due to the fuel and not to any difference in the boilers.

As a rule, it may be said that the area of "live grate" should be as small as possible, that will burn the amount of fuel necessary to generate the required amount of steam. The area of grate to give the best results will depend largely on the quality of coal used. For instance, a grate area of the proportions generally used in the Wootten boiler would certainly be wasteful in fuel where a good quality of bituminous coal was used, but would perhaps be the most economical where a very inferior quality of anthracite or semi-bituminous coal is burned.

As nature has made the coals to differ greatly in kind and quality, equal variety in the proportions of grate and to a certain extent of fire-box and boiler seem necessary in order to obtain the best results in its consumption. Careful tests and observations must be relied on mainly to determine the proper modifications necessary to suit each variety of fuel. No one pattern will answer best for all kinds. It is important, more particularly, however, where bituminous coal is used which is rich in gas, that the area of fire-box be large enough to give time for the perfect combustion of the gases before they enter the tubes, that the heating surface be as great and the boiler as large as possible within the limits allowable for the class of engine in which it is used.

A large quantity of water in the boiler gives a large capacity for storing away heat (power), accumulating it when the demand for steam is comparatively light and giving it out as required in the variable quantity of steam required in a given time in the ordinary use of the engine, without causing the great variations in boiler pressure that occur when the boiler is deficient in capacity.

A large boiler, like a fly wheel, accumulates power when it would otherwise be wasted in part and responds to sudden demands for it, for a time at least, without much apparent diminution of its force.

As regards the material for boilers and character of the workmanship there need not be any great differences. All should be as nearly perfect as possible. A boiler that is strong enough may be said to be as strong as it is worth while to make it, no matter how constructed. But a boiler may be strong enough when new, and yet not be strong to withstand with safety to a good old age the weakening influences of corrosion, unequal expansion, the springing of the sheets from their original shape by pressure and the strains from boiler attachments.

Theoretically and practically our boilers are ample in strength when new, but in the course of time the influences referred to have in many cases so operated on the boiler that it is found to be in parts both theoretically and practically too weak. Where the metal was ⅜ or 3 16 in. thick originally, it is found to be perhaps less than ¼ in. in places; and at others where the thickness has decreased but very little, cracks or furrows are more or less developed, caused by expansion and contraction or other strains that spring the sheet. (I refer to the shell of the boiler and not the fire-box) and this too before the boiler has been in service half its natural lifetime.

Patching or replacing these defective sheets then begins, probably, too, at a time when it is most inconvenient to do it.

Testing a large number of boilers by hydraulic pressure that have been in service a number of years as they came to the shop for repairs, convinces me that the margin of safety between the ordinary pressure carried and that necessary to produce rupture in the weakest place is unpleasantly narrow in the case of many old boilers in service on the roads in this country.

At the base of the dome seems to be the weakest point in many old boilers, insufficiently braced as far as my observation goes. Much improvement has been made of late years in increasing the strength of boilers, by the use of thicker sheets, a better plan of joints and seams and better bracing; but as a rule there is still room for improvement in that direction.

Our English friends are far ahead of us in the strength of their boilers. We think they go to the extreme in using butt joints, outside and inside welt pieces, drilling and reaming all rivet holes and in the thickness of plate used, etc. And perhaps to a certain extent they do: yet I am satisfied that if we imitated them a little nearer in the thickness of plate for the shell of the boiler and strengthening the base of the dome, it would be a paying investment in the matter of durability and lessening the cost of repairs.

As a rule the metal used in the shell of our boilers is not thick enough; not that the boiler is deficient in strength to withstand the steam pressure with perfect safety when new, or that the seams are not strong enough, but there is a want of stiffness or rigidity about it. In other words, the shell of the boiler is not as strong proportionately as the other parts of the engine, and it is generally the first among the expensive parts to require repairs.

When the diameter of what was considered a large boiler some years ago was 44 in., the thickness of the sheets was seldom or never less than ⅝ in. Now when the common size for a large engine is 54 in., the thickness is seldom more than $\frac{7}{16}$ in. The diameter has been increased 22 per cent., while the thickness of the sheets has been increased only about 16 per cent.

Consider that the steam pressure has also increased with the increase in the diameter of the boiler, to the extent of perhaps 8 per cent., the thickness for the sheets for the shell of a 54-in. boiler should be ½ in., to be as strong proportionately as the 44-in. boiler, when that was the general size in use.

Mr. M. N. Forney, of the *Railroad Gazette*, has kindly sent me sketches of a plan for strengthening the boiler at the base of the dome, which I present with this paper as worthy of consideration.

Mr. Forney says: "While in England last year I noticed that instead of putting two longitudinal seams on each side of the outside of the fire-box shell they bring the two side sheets up and make the joint on top. Their method of putting on the dome is different from ours, so I have made the inclosed sketch, showing how their plan of construction could be adapted to our plan of putting on the dome. Instead of putting the seams at the sides the two plates are carried up and join each other end to end at the top. A thick plate ⅝ or ¾ in. is then made and forms the welt or covering strip for the seam, and also the reinforcing ring for the opening of the dome. This plate may be flanged up as shown, and the dome riveted to it as represented. Short covering plates are riveted on the outside. On the English engines, the plate which I have represented on the inside is put on the outside and forms part of the dome base, and is made of angle or channel iron; of course the outside plate or ring can be made as thick and wide as may be desirable. This plan I think makes a much better job than the ordinary method of construction used in this country. It gets rid entirely of the longitudinal seams which are liable to crack, and the opening for the dome may thus be reinforced as much as may be desired."

The only objection to this plan of strengthening at the junction of the dome and boiler it seems to me would be the difficulty in fitting the ring piece to the boiler sheets; so as to make a perfect fit. Where so many laps come together and of the shape required it is very difficult to draw the laps perfectly tight together, and if the fit is not perfect in all parts leakage is liable to occur sooner or later at the rivets at such place.

The Belpaire boiler, extensively used in locomotives in Europe with very good results, has heretofore been but little used in this country. The Rogers Locomotive & Machine Works have, however, built several of these boilers within the past year for the Denver & New Orleans Railroad. The water used in them is said to be very bad, but they have not yet been in use long enough to determine their advantages as compared with the common form of boiler; but so far, it is claimed that the results have been very satisfactory.

A slight curve or oval in the shape of the crown head or a slope backward would, I think, be an improvement in allowing any loose deposits on it to work off and pass down to the mud ring.

The Rhode Island Locomotive Works built two of the Belpaire boilers for burning anthracite coal for the State Line & Sullivan Railroad in 1877.

I have failed, however, in my efforts to obtain any information from the parties using these engines as to how they compared with those having boilers of the ordinary type, but I learn from Mr. Durgin that so far they have given entire satisfaction.

The connection sheets between the fire-box shell and the cylinder part of the Belpaire boiler should in my judgment be made of thicker plates than the other parts of the boiler, otherwise they would be liable to furrow on the inside, at the short curves, from unequal expansion and contraction: experience has shown that with light plates furrowing manifests itself sooner or later in sheets of that form connecting the two parts of the boiler.

Where water is used that deposits little or no scale on the fire-box sheets, the Belpaire or any similar plan, without crown-bars, would perhaps show but little superiority over the common plan in evaporation or durability, if the crown-bars are high enough above the sheet, say 1½ or 2 in., to permit a free circulation, but in the case of water such as is used in a large proportion of the boilers in service, containing lime and other impurities which are deposited in the form of scale on the inner surface of the boiler, it would seem that the boiler having the least area of surface where this deposit on it would have an injurious effect would be the best, other things being equal. Where bad water is used the difference between the two plans of boiler, it seems to me, is this: In the one having crown bars, the whole of their surface affords area on which the deposits of scale are formed. They are not heating surface and the deposits on them would do no harm, except that when they became heavy, more or less of the scale breaks off and falls on the crown sheet, preventing the water at such places from coming in direct contact with the sheet, and if not promptly removed, the sheet becomes overheated, and in time "bags" down between the bolts, making a pocket in which additional scale falling from the crown bars is held, and the evil increased. In the case of the boiler having no crown bars, this source of evil does not exist to so great an extent, and in that particular at least, it is the best.

Now, if we assume that a crown sheet 72 by 46 in. is supported by crown bars, fourteen bars made of two pieces of .5 by ⅝-in. iron will be required. These have their outer and inner surfaces in contact with the water Each bar (pair), has about one thousand square inches of surface exposed to the deposit of the impurities in the water, in addition to the surface of the sheet itself, and that of the braces and stays that may be situated directly over it and below the water line.

In the case of a crown sheet of the above dimensions stayed by bolts to the outer sheets of the boiler, about 126 bolts 1 in. in diameter, would be required. If the depth of water carried over the crown sheet averaged 12 in., the surface of these bolts exposed to deposits of scale would be 4,747 square inches, or only 33 per cent. of the surface presented by crown bars.

From this it is safe to conclude that the crown sheet stayed by bolts without the use of crown bars will receive only about one-eighth as much of this detached scale falling from the surfaces of the bolts and bracing directly over it as the one supported by crown-bars; and as the detached scale falling from the crown-bars and braces where the water is very impure is a troublesome and expensive matter, the question of reducing the dead surfaces, as they might be called, where these deposits are formed, to the lowest practical point is one that seems to me worthy of more consideration than is generally given to it.

R. WELLS.

DISCUSSION

The PRESIDENT: For the purpose of provoking some discussion, I would like to criticise that method of boiler construction a little. I am not quite satisfied that the butt joint, so called, with double welts, one outside and one inside, is the strongest possible seam. I think a single lap, or a lap wide enough to take two rows of riveting, with that welt underneath—extending out to take a row of the rivets outside of the same rivets—makes a stronger joint, for this reason: With the method illustrated on the blackboard there are four rows of rivets, and the two outside rows have necessarily got to be close enough together to make tight work, perhaps two inches from centre to centre. If they were separated more widely than that, there would be great liability of leaks occurring. Now, a seam with rivets only 2 inches or 2¼ inches from centre to centre reduces the strength of the sheet very materially. By making a single lap, or double lap—if extra strength is wanted—the rivets, passing through the laps, can be placed close enough together to make tight work. Then the seam is reinforced by the welt underneath, and the rivets through the edge of the welt can be placed at least 3 inches apart, because they have nothing to do but fasten this welt to the plate to reinforce it.

Mr. FRY: The reason for making a butt joint as given to me by those who use butt joints has always been that it prevents the furrowing at the seam which is common with the ordinary lap-edged boiler where the water is bad. The seam referred to by our President has been used and found cheaper than the joint illustrated; and if it obviates the furrowing of the seam it would be extremely useful to know it. The double-riveted ordinary lap joint is amply sufficient for our boilers so far as mere strength is concerned, and it is simply a question, I believe, of prevention of furrowing that has led to the butt-joint boiler. I was assured when I last visited England that since they adopted the butt joint, they have, to a large extent, prevented that furrowing action. I believe one of the principal reasons that induced Mr. Johann to adopt that form of joint was to find a method of preventing furrowing. Now, if the furrowing is prevented by the butt joint, it is, of course, a very valuable thing, but if we can prevent the furrowing action just as well by the joint suggested by the President, it would be very important for us to know it.

Mr. WILDER: I suppose it is generally admitted that there is no furrowing action above the water line.

The PRESIDENT supposed that the furrowing came from the effort of the shell, when strained, to pull into a true circle, thus causing bending at the lap joint as often as strain was applied or taken off.

Mr. SEDGLEY: We have never used the butt joint. We have engines upon our line in which our boilers have been used for twenty-five years, with the welted joint, and to my knowledge we have never had to repair a boiler where the seam was welted. We have on portions of our line very bad water, and those same boilers without the welt will require patching inside of four years and will furrow completely through. We have no trouble above the water line. I have had ⅜ plates furrow through inside of eighteen months so there would not be a sixteenth of an inch. I had one severe case where we discovered a leak in the bottom

part of the boiler and we tried to ascertain the cause of it. We took out the tubes and examined them, and there were sixty inches of the longitudinal seam that would not measure a sixteenth of an inch thick. I think it was a case where the circle was not uniform and there was an unusual amount of strain when the boiler was under pressure, so that the grain of the iron was exposed upon the inside; and I look upon it as a sure cure for that trouble to welt the seam. We use a $\frac{5}{16}$ welt for a $\frac{3}{8}$ shell.

Mr. WILDER: Mr. Sedgley's remarks would seem to bear out the statement I made that little or no furrowing takes place in the boiler above the water line. If we need the welt to strengthen the joints, it is all right. If we order our plates large enough to put our seams at the top of the boiler instead of the bottom, we will, to a large extent, obviate the trouble we have in furrowing.

Mr. HAYES: For the last ten years, we have built all of our boilers in one or two single sheets for the cylindrical part of the boiler, making all the laps longitudinal on the boiler above the water line, and in no case have we had any trouble with the furrowing of the seams. But in the older boilers as built some twenty years ago, where the seams were below the water line, we had a great deal of trouble in the furrowing of seams; but after having a good deal of trouble and patching in various ways, we proposed putting a liner of $\frac{1}{16}$ iron running around just one-third of the circle of the boiler and riveting very lightly, and in that case, we found an entire prevention of the furrowing of seams. I think we had it in use four or five years since we put the first one on. That was put on an old boiler that had furrowed until it became weak. We put it in there merely as a strengthening sheet; but when we examined it, we found that the furrowing did not continue after the use of it two or three years, and then we adopted it on all our new boilers, and on every boiler we built within the last five years we put this liner inside, running around one third of the circle of the boiler, and in no case have we had a single seam furrow since we adopted that system. We put the rivets about 5 inches apart, and the water passes between them until it forms a scale. That scale or glazing seems to remain, but it does not cause any furrowing at all.

The PRESIDENT: The experience of Mr. Hayes somewhat upsets my theory, it seems to me. I was going on the theory that the furrowing was entirely due to the bending action of the plate that takes place when put under pressure, and then comes back when the pressure is taken off. This liner certainly does not reinforce those seams. They are subject to precisely the same pressure, and must assume the same form they would if the liner was not there. I am afraid we are attributing the furrowing to causes that are fallacious. If putting in a liner from $\frac{1}{8}$ to $\frac{1}{16}$ of an inch will settle it, it cannot be due to the fact to which I have attributed it. Moreover, it appears that the seams above the water line do not furrow.

Probably the cause of the furrowing is the mechanical action and the chemical action combined. Either one by itself would not cause it, but the mechanical action disturbs the vibrations and keeps the places raw. If they get glazed over a little, the first time you heat them up it leaves the raw iron, and the moment you get a furrow started, there is a weak spot, and all the strains are concentrated there and that place keeps raw and attracts deposits from the water; that space having once been filled excluded all fresh action of the chemical properties of other substances deposited on the plate, and the plate itself keeps the chemical action of the fresh deposits from acting upon the seam. There is no doubt at all that until that space is filled there is a chemical action and the furrowing goes on as the result of the oxidation of the iron, as the place is kept raw.

Mr. FRY: I would like to ask whether grooving takes place if the lap is a short distance below the surface of the water. We have learned from the present discussion that no grooving takes place if the lap-joint is made with a covering strip over that, and that even a very light liner will prevent grooving. Now it sometimes happens, in designing a boiler, that it is difficult to get the lap entirely out of the boiler space, and there are quite a number of boilers running with the laps in that space. I have been informed that they do not groove when they are just a little below the surface. Mr. Hayes' method of preventing the grooving does not add to the strength. The only objection to his plan is, to my mind, that it would prevent an examination of one of the most important parts of the boiler to be examined.

Mr. HAYES: We have had occasion to remove a number of the liners, and in no single case did we find any of pitting or furrowing below them; but we do find that some little pitting takes place in the liner. Before we commenced using that we were not troubled solely with the furrowing, but also with the pitting between the seams. In some places it would eat out the size of a nickel and half way through the sheet. By the introduction of this liner we have prevented that entirely; but that does take place a little upon the liner.

Mr. JOHANN'S paper on the same subject was then read.

The PRESIDENT: I must say that I unhesitatingly object to bringing the lap on top of the boiler. The only advantage evidently is to get rid of one seam. It seems to me the disadvantages of having the seam on the top of the boiler, and then cutting out through that seam and attaching a dome, would more than counterbalance any supposed advantage gained. The difficulty of fastening a dome there and getting tight work must be great. Then the strain tending to rip open the boiler must necessarily be concentrated at that seam to a great extent.

Mr. SEDGLEY: During the past three or four years we have made quite a number of boilers, the side sheets coming up on top as represented in the sketch, only we put a seam through instead of making a butt joint and slotted the seam. It was for a class of engine where the dome went through the cylinder part of the boiler, and I presume that that is the English practice. You are well aware that with the majority of their engines, the dome is on the cylinder part of the boiler, and I believe it is decidedly preferable to putting the seam on the side of the fire-box. There is in that part of the boiler more expansion and contraction, because it is not perhaps so well stayed. The circle is not as perfect there, perhaps, as it would be upon the top of the boiler, and my preference is decidedly for making the outside sheets of the fire-box two sheets instead of three. I should rather make it one. I see no good reason for not making our boilers in that way. We save one seam, and it is less work to make it in that way; and I believe it is decidedly preferable if we do not put the dome over the fire-box, and if we do I see no objection to making it so even then.

In regard to putting on the dome, it sometimes happens that it is very difficult to arrange a dome on the barrel of the boiler without throwing the seam down into the water space. It sometimes happens in designing a locomotive that you have a very large dome—a 28 or 30-in. dome, and for some reason you do not like to get the seam close to the foot of the dome, and to get it just where you want it it gets just down into the water space, and many engineers are under the impression that the seam is just as safe from grooving if it is 6 inches below the top of the water space as if it is within the steam space. If it should be found to be subject to grooving only a few inches below the water surface, you would then be obliged to put the seam up on top. If the objections which our President thinks hold good against placing the dome on the top of the seam are sound, it is very difficult to design a boiler that will be satisfactory. But if is only a fancy; if there is no objection; if it is perfectly safe to put the dome right on top of the seam, it is a very valuable fact for us to know, for it will very often help us to get up a new design. The suggestion that Mr. Forney makes of putting on that heavy piece necessitates also keeping the hole for the dome the same size as the dome. Many engineers have made a large dome and have made a small hole, and it will be interesting to note whether there is any experience in that form of construction, because you might get by that means a very much easier way of strengthening your dome. The dome must be brought down and flanged and riveted to the boiler, the barrel sheet carried forward and a small hole made in it, and if necessary a covering strip around that hole. A strengthening ring such as Mr. Johann uses could be run around the hole. That would seem to me to be a very much cheaper and easier form of putting on our domes than that suggested by Mr. Forney.

The PRESIDENT: I accomplished my object. I would say to the members in drawing out a little discussion on this question that was mainly the reason I took the position I did in regard to putting joints together at the top of the shoulder.

Mr. WILDER: Mr. Hayes says that he puts his liner in to cover one-third of the circumference of the boiler, and he has no trouble whatever in furrowing above that point, I mean above the point which the liner covers, and from that experience there would seem to be no objection to putting the seam down below the water line.

Mr. JOHANN: In the case of a boiler explosion that came under my notice very recently, unquestionably the boiler let go just at the seam—the horizontal seam; I should judge as near as I can remember now that it was three inches probably below the water line. On investigation it showed that the sheets were furrowed and a very large portion of it had but about $\frac{1}{16}$ solid metal, and from all indications that was the source of the giving way of the boiler and that was the seam that was not more than three inches below the water line.

Mr. SEDGLEY: I would ask Mr. Johann if, in the arrangement referred to, he examined the seam to know if it was uniform—if there was not some irregularity in the form of the boiler at that point. Several years ago we had a case I think very much like that Mr. Johann speaks of. The boiler gave way for some five or six feet, but there were no symptoms of furrowing. In my experience I have never found any furrowing above the centre of the boiler. I should be very glad to know whether it is the case that it takes place two or three inches below the water line; in fact, I do not welt my cross seams if I can get them up within four inches of the water line.

Mr. JOHANN: In answer to Mr. Sedgley, I would say it was utterly impossible to form any opinion of the condition of the sheet, for it was twisted out of all shape, but it was not simply a crack; it was a decided furrow, that was unquestionable; and on the internal surface it was furrowed out for a space of $\frac{3}{8}$ in. and chamfered down in that way till it left about $\frac{1}{16}$ in. of solid metal.

Mr. DURGIN: I would like to ask these gentlemen who are familiar with this furrowing if they calked their boilers on the inside, if they ever notice any difference whether calked or not; and if calked, how calked; or whether they start the furrowing in the first place?

Mr. FRY: I do not think that the furrowing is to be attributed to the calking to any considerable extent. The furrowing of boilers is almost entirely confined to the West, where the water is bad. There is scarcely any furrowing of boilers where the water is good, and, so far as we have obtained evidence from the members present, there is no furrowing above the water line and not very much just below it. I think it is very evident to all of us that the workmanship has not very much to do with it. It is not likely that all the good workmen are confined to the Eastern states, or states that have good water, and all the bad workmen confined to the Western states where the water is bad. The probability is that the work done is about equal in the various sections of the country, but it is very important that we should know where it is safe to place our seams, and if we can get any further evidence substantiating Mr. Johann's experience that furrows do sometimes take place even a short distance below the water line, we shall have a good warning then to keep our seams away up in the steam space.

Mr. SEDGLEY gave some instances which tended to convince him that boilers of irregular shape above the water line will groove there from change of form, but he also believes that below the water line the injurious effect of the mechanical action is much increased by chemical action. He had never yet seen, when the surfaces were properly stayed and the boiler a true circle, any grooving above the water line. He added, I think this pitting is very much more mysterious than the working off of the sheets at the seams. I do not think that there is anything mysterious about that at all. The tendency of the boiler is to draw in a circle, and if there is the least working of the boiler it is only just a question of time how many times that can come and go before it breaks off. But when you take the bottom of a tank or the bottom of a boiler and you find pits as large as a dime scattered all over it, in some places thick, and in some places only occasionally, and can give no account of it; when you find sheets pitted up in that way I confess I am entirely unable to account for it. Sometimes I have had a hole, just a single one, as large as a dime, go clear through the sheet, and all around it the sheet would be of the original thickness.

Mr. HAYES: I have attributed this pitting to defect in the metal when it is first rolled. I am pretty certain in my own mind that that is the cause, because some metal will do it a great deal more than others.

THE SCRAP HEAP.

Baggage at Pittsburgh.

During the month of July there were 27,034 pieces of baggage forwarded from the Union Station in Pittsburgh, and 26,484 received; making in all 53,513 pieces handled, an average of 1,726 a day.

Sale of Car Works.

Sealed proposals will be received at the office of the assignee, for the purchase of the grounds, buildings, machinery and material of the Jacksonville Car Co., prior to Aug. 21.

These works have a capacity of eight freight cars per day, occupy about about eight acres of land at the junction of the Chicago & Alton and Jacksonville Southeastern roads, and have about two miles of side tracks connecting with the roads.

The buildings are of brick and frame, with shingle, board or gravel roofs, and consist of four erecting shops, wood shops, machine shop, blacksmith shop, foundry and boiler room, all amply supplied with modern machinery for car building. The works are well stocked with large quantities of seasoned oak, yellow and white pine, paints, and all kinds of material used in the manufacture of cars.

The property will be offered in two lots, namely: Lot A, consisting of the grounds, buildings, tools and machinery, and all materials; Lot B, consisting of office fixtures, patterns and two 33-ft. coal cars.

The terms of sale are cash. The right will be reserved to reject any and all bids; and in the event of no bid being satisfactory, the assignee will, on Aug. 28, at 2 p. m., at the office of the works, sell the property to the highest bidder for cash.

Lot A will be sold subject to a mortgage of $55,892.66. A deposit of 10 per cent. of the purchase money will be required, from the successful bidder, the same to be forfeited if the purchaser fails to make good the purchase: and sale must be approved by the Court.

Further information can be obtained on application to A. R. Gregory, Assignee, at Jacksonville, Ill.

Henry's Velocimeter.

A special train, consisting of an engine and one coach made a run of about 15 miles out from Kansas City and return, over the Fort Scott & Gulf road, yesterday afternoon, for the purpose of testing an invention of the Train Dispatcher of that road, Mr. John C. Henry, destined to gauge and register the speed at which a train is running. The following gentlemen were on the car: Superintendent Barnes of the Lawrence & Southern Kansas, Superintendent Clinton of the Fort Scott & Gulf, Superintendent of Machinery McCrumb of the Fort Scott & Gulf, Mr. McKinzie, Superintendent of Machinery of the Union Pacific, Superintendent Brinkerhoff of the Kansas Pacific, and Mr. Griffith, representing the General Superintendent of the Union Pacific. One of the machines was placed on the engine and one in the car. It consists of a dial like that of a steam gauge, with an index which marks the increase or decrease of speed and a registering instrument something like the anemometer used by the Signal Service for registering the velocity and direction of the wind. This register is furnished with a coil of paper divided into squares by lines, those running lengthwise, 60 in number, showing the speed and the transverse lines dividing the record off into miles. Mr. Henry claims for the instrument that it affords a complete check on the actions of trainmen and shows the officials how near they come to complying to the rules and instructions. The indicator affords the engineer the means to handle his engine with great regularity and smoothness.

During the trial trip the train ran at various rates of speed to test the velocimeter. The gentlemen who watched its workings were greatly pleased with it, and pronounce it a valuable invention.—*Kansas City Times, July* 30.

He Came from the West.

The other day a railroad agent was engaged in posting railroad schedules at Astor with his little hatchet, and seeing a darkey looking at the posters, the following dialogue took place:

"I say, boss, is dis de circus what Mister Astor is goin' to bring down heah?"

"Not exactly. I am the advance agent of a great enterprise. This is not a circus in the ordinary acceptation of term, but a straight line, and our only quadruped is the iron horse."

"Jes so, boss, jes so. I don't prezackly understand what you say, although I know what you mean. Is dis a straight circus?"

"No, it is a railroad."

"Oh! A railroad! Whar its going to run, boss?"

"It is already running. It is opening up the Great West, and converting its dreary wastes into a busy mart of trade."

"Its doin' dat, is it? Well I declar!"

The tacks were hammered while the agent whistled "Hannah's at the Window." The darkey scratched his head and searched for an idea.

"I say, boss, is dat all true about de West?"

"It is, and I would advise you to go West yourself and grow up with the country."

"Yer can't fool me, boss, fer I came from the West my self to work on dese railroads."

"What part of the West?"

"From West Florida."—*Jacksonville (Fla.) Times.*

An Obstinate Swamp.

The Cleveland (O.) *Herald* thus sets right a matter concerning which paragraphs have been floating around in the papers:

"The New York, Pennsylvania & Ohio engineers have been engaged for some months in filling in what is known as the Tamarac Swamp on their Sharon Branch, between Sharpsville and Sharon Junction. This swamp is a sort of peat-bed or ancient lake, about 700 ft. across and 70 ft. deep in the centre. The road was constructed on piling seven years ago, and it was found necessary to either repile or fill in, and the latter was considered the cheaper method. Cinders are the material used, and some 60,000 yards have already been dumped in the bog. Instead of finding no bottom, the cinder is now five feet above the surface of the lake, furnishing an excellent foundation, and not a "fruitless job," as a contemporary states. About 13,000 yards of cinder will be required yet to bring the roadbed up to grade, and then the track will rest as upon an adamantine wall. The improvement complete will cost about $20,000, and the adopted plan will be cheaper than to have changed the route. Chief-Engineer Latimer is satisfied with the job, and this statement of the facts is made that the public may know the work has not been a failure."

New Sleeping Cars.

Attached to the night train over the Alton road which left for St. Louis at 9 o'clock last evening were two new Pullman sleeping-cars which are ahead of anything yet seen in this city. These two cars, known respectively as the "Lochiel" and "Lomond," with two similar cars to be placed on the road next week, will run regularly between Chicago and the other end of the bridge. Each car is 72 ft. in length and is mounted on standard No. 5 trucks and twelve 42-in. paper wheels. The exterior work is as fine as anything known in the line of car decorations, being finished in dark lake with gold striping. On the interior ornament has been lavished. The berth fronts and paneling are of a light mahogany, beautifully inlaid with lighter woods in tasteful designs. The ceilings are of wood, and there is a double-burner lamp to each section, so that reading in these cars by night will be comfortable. Each car consists of 14 sections (two more than usual) and a comfortable smoking room. At the other end of the car is a ladies' dressing room elaborately fitted, and throughout the cars numberless minor improvements and conveniences have been introduced. Noticeably among these are the curtains and lambrequins and the large panel mirrors. The fittings and arangements of the berths are more than up to the Pullman standard, and the berths are large and roomy.—*Chicago Tribune.*

The Fidelity & Casualty Co.

The Fidelity & Casualty Co., of New York, gives notice to railroad companies that its authorized traveling inspectors are Mr. H. J. Black, formerly inspector for the Guarantee Co. of North America, at Montreal, and Mr. W. H. Lee, formerly of the London (England) Guarantee & Accident Co.

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published*

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ASH-PANS.

There seems to be good reason for believing that this unobtrusive appendage to locomotive engines has, in this country especially, been very much neglected. Its primary purpose is to act as a receptacle for the ashes and cinders which fall from the grate and prevent them from being scattered on the track and thus setting fire to any combustible material with which they may come in contact. But the ash-pan is also the passage through which most of the air is admitted to the fire, and to a considerable extent regulates the supply. It should be kept in mind that in the process of combustion air and fuel have reciprocal functions, that is, that fuel without air will not produce heat any more than air will without fuel, and that the value of air, if measured by the quantity of heat produced, is as great as that of coal. Or, to state this fact in another way, if there is not enough air to produce perfect combustion, there is just as much loss as though part of the fuel was thrown away. On the other hand, if there is too much air, there is a waste of heat from a different cause. To quote the language of C. Wye Williams, "*On the control of the supply of air depends all that human skill can do in effecting perfect combustion and economy.*" As the ash-pan is the principal means by which the supply of air is regulated, it will be seen that its function is a very important one.

In this country ash-pans are generally constructed without any special design, in planning the engine; all that is done is to keep the bottom of the fire-box high enough above the rails so that a depth of 10 or 15 inches can be given to the receptacle for ashes. This latter is made of tank iron, and is usually of the rudest construction, no effort being made to have the joints or the dampers air-tight. The latter are placed either in front, behind, or on the sides, and usually they consist simply of a hinged flap of sheet-iron which covers an opening formed in an extension of the ash-pan. To clear out the ashes and cinders it is generally necessary for the fireman to go underneath the engine and rake them out with a fire-hoe. The work is very disagreeable and consequently is very often neglected. Of course when the space below the grate becomes filled or partly filled with ashes and cinders, the passage of air to the fire is very much obstructed, and the supply becomes irregular and uncertain. It is impossible, too, to regulate the supply of air to the fire with any degree of precision if the ash-pan and its dampers are badly fitted, and consequently air leaks in at various crvices which ought not to exist. It is of course true, that the action of the powerful blast in a locomotive will draw more or less air through the grate and the fire, if the obstructions in the way are not absolutely air-tight. It is plain, though, that if the fire is regulated with any precision the channels and passage ways by which it is admitted must not be subject to obstruction, and ought to be constructed so that they can be regulated exactly by the person in charge of the engine.

The importance of this has been recognized in Europe, and the ash-pans of English engines, instead of being constructed of flimsy tank-iron, are made of boiler plate, reinforced with a heavy angle iron riveted to the upper edge. The top of this angle-iron and the bottom of the mud-ring of the fire-box are planed, so that a tight joint can be made with red lead when they are bolted together. The dampers are all fitted so as to be as nearly air-tight as possible. By this means the amount of air admitted through the fire can be regulated with great exactness, and the use of the furnace-door deflector to admit air above the fire is almost universal.

For some reason American master mechanics have not been able to use these deflectors successfully. Whether it is that our locomotives are worked harder than English engines, and that the temperature in our fire-boxes is higher, it is impossible to say; but it is certain that wherever the furnace-door deflectors have been tried in this country, they have been burned out so quickly that it has been necessary to abandon their use. Possibly their rapid destruction here may be due to the fact that firemen, when they get into a critical position, and are liable to "lose their steam," will close the furnace door entirely, because they find that they can keep up steam better, when working hard, with the door closed than they can with it partly open. There is no doubt that locomotives on American roads are worked harder than they are on English lines, so that the difficulty of making enough steam and pumping up a supply when the engine is working hardest is greater here than there, especially if taken in connection with the fact that generally English locomotive superintendents have given the engines more heating surface in proportion to their weight than has been the practice here. But, after making all allowance for these considerations, it must be remembered that for each pound of coal consumed there is an exact quantity of air required. If less than this is supplied, combustion will not be perfect. If more than this is admitted, the effect of the superfluous quantity will be to cool the fire and, in the language of the firemen, to "knock down the steam." If the supply of air admitted below the grate cannot be regulated with any certainty, the result will be, if any is admitted above the fire through the furnace door or elsewhere, that at times there will be too much and at others probably too little. Thus supposing an engine is pulling a heavy load, it is necessary to work it at nearly full stroke, and a considerable quantity of fresh coal has been thrown on the fire. As this expands, in the process of coking, the passage of air through it is obstructed, and to get an adequate supply for perfect combustion some air must be admitted above the fire, and the engine would then make steam better to admit some air through the furnace door than it would without such a supply. In a little while, though, the hydro-carbon gases are all distilled from the fresh coal, and the process of distention, which occurs during the process of coking, has ceased, so that as the process of combustion goes on the spaces between the lumps of coke, for the passage of air through the fire, increase, and consequently more air is admitted from below, so that with the supply through the furnace door there is then too much air, and consequently, the temperature in the fire-box is reduced. The fireman soon discovers that the engine under these conditions will make more steam if he closes the furnace door than it will if the door is partly open. He therefore closes it, with the result that the deflect r over it is burned out. To prevent this, the furnace doors on some English engines are made so that it is impossible to close them entirely. The supply of air is regulated through the ash-pan. That is, when a considerable quantity of fresh coal is thrown in the fire, the ash-pan dampers are opened, and when this is thoroughly coked, they are partly closed, the furnace door being always partly open. It must be kept in mind that just as soon as too much air is admitted to the fire the steaming capacity of the boiler is diminished. With the heavy loads which are now hauled, the question which firemen must consider most—at least at some places on the road—is how to make the greatest quantity of steam, without reference to the economy of fuel, so as not to stick fast on the road. If they are to admit air above the fire to consume the smoke, the appliances must be so arranged that this can be done without diminishing the maximum capacity of the boiler to make steam. If it is impossible to regulate the supply of air below the fire with any degree of certainty or accuracy, the fireman will close the furnace door if he can, with the result of burning out the deflector.

It seems probable, then, that the successful use of furnace-door deflectors is dependent to a considerable extent on the construction of the ash-pans, and the facility which the latter afford for regulating the supply of air to the fire. It is certain that the construction of ash-pans is deserving of much more attention than our master mechanics generally give to it.

THE CHICAGO & NORTHWESTERN REPORT.

For the last five years the Chicago & Northwestern has been engaged in rapidly extending its system by the construction of new lines in Wisconsin, Michigan, Minnesota, Dakota and Iowa. At the close of its fiscal year ending May 31, 1877, which was nearly coincident with the lowest point in the depression of business, and especially of railroad business, that followed the panic of 1873, it had 1,993 miles of road, which had scarcely been increased at all for the three years following the panic, before which the company had engaged actively in construction, as it has done since 1877. In these five years it has added 1,285 miles to the length of its system; and it has under way about 240 miles more, which will probably be finished this year and will complete the system so far as now planned.

The addition of so large a mileage changes materially the property of the company, and makes it proper to compare its position before and after it was made; that is, at the close of the fiscal year ending with May, 1877, and at the close of the last fiscal year. Such a comparison is subjoined:

	1882	1877.	Increase.	P. c.
Miles of road	3,278	1,993	1,285	64.5
No. locomotives	558	369	189	51.0
No. cars	18,650	9,289	9,361	100.8
Capital stock	$37,249,043	$30,464,827	$784,216	2.1
Funded debt	64,248,000	46,418,000	17,830,000	38.4
Gross earnings	23,084,656	13,033,102	10,051,554	81.7
Net earnings	11,045,922	5,507,001	5,538,021	100.6
Fixed charges	5,666,947	4,578,659	1,088,288	23 8
Surplus	5,378,075	928,342	4,449,733	479.4

This certainly shows a property growing in prosperity as well as in extent. While the mileage increased two-thirds, the stock of locomotives increased one half, and that of cars doubled. This was done with almost no addition to the capital stock, and with an increase of three-eighths to the funded debt, being at the rate of $13,866 per additional mile of road, while the increase in fixed charges was less than one fourth, and less than $850 per additional mile of road. It should be said, however, that the fixed charges last year are not the whole of those that will accrue on the mileage as it was at the close of the year, for the reason that a considerable amount of bonds issued on new road did not run all the year. The interest on the funded debt outstanding at the close of the year will be $4,254,635, which is $255,426 more than the interest that was paid during the fiscal year; adding this will make the increase in fixed charges consequent on the addition of 1,285 miles of road since 1877 $1,343,714, or at the rate of $1,046 per mile of new road, while the increase of net earnings in excess of fixed charges has been about $4,450,000.

Of course it would be a great mistake to suppose that all this enormous increase of 480 per cent. in profits was due to the additions to the road. Most of it certainly was due to the growth of traffic on the old lines, which has been considerably promoted by new additions to the system, to be sure; but a very large part of the additions were still too new and in too new country to have added much to the profits of the company. They will have a much greater effect during the current year and succeeding years than they have yet had. None the less is the result a justification of the policy of extension which the company has been following. For the question for a company like the Northwestern, whose lines reach the border of an unoccupied fertile district, is not so much whether it shall extend as when it shall extend. Extend it must, and yet the questions of time and manner are among the most delicate with which men have to deal, and require the soundest judgment and the greatest care. Where new territory is to be opened for settlement by new railroads, the roads should be built so as to bring in the settlers while they are coming. They may be built too early, and lie in the wilderness, with the rails rusting, till growth recommences; and they may be built too late, when the ground is preoccupied.

Now the above figures show that the work of construction begun by the Northwestern in 1877 was at the beginning of a period of growth and in time to take advantage of it. At this time, when the work of new construction on a large scale is approaching com-

pletion, the growth of population in the new country, and of traffic, shows no signs of declining, and the company has a vast extent of new territory tributary to it ready to take advantage of this growth, and actually taking advantage of it. Whether the company will be equally wise in restricting its construction hereafter for a time, it may be said, remains to be seen. But it is extremely doubtful if it would get any advantage by making more new lines even if the present rapid growth of the new country in the Northwest should continue for several years. It now occupies its front. It has hundreds of miles in Iowa, Minnesota and Dakota where there is room for a great addition to the population; and this country, on lines already built, is almost sure to be occupied before settlers go further west in large numbers, or to adjacent districts distant from a railroad. That is, it has plenty of new country on its lines to last for several more years of rapid settlement, and it is of course desirable that this should be occupied before any more new lines are pushed out in advance of population.

These great additions to the property of the company, and the other great additions represented in the improvement of the road and its structures, which are going on almost continuously on nearly all roads, and usually quite rapidly on roads in new country with rapidly-growing traffic, have not been made simply from the proceeds of the comparatively small addition to the funded debt. In the last seven years the accounts show a surplus of undivided profits amounting to $7,931,000. Last year alone there were cash receipts from sales of lands amounting to $820,195 not included in earnings. That is, an immense amount of profits have gone into construction and are represented only by stocks of the proprietary roads, which, owned by the company, are among its assets, and not its liabilities.

The last fiscal year showed great growth in the traffic of this company, notwithstanding light crops. It should be said, however, that the country in which its lines are situated suffered much less last year than the country further south. The wheat crop in Minnesota fell off (compared with 1880) 10 per cent. in 1881, while the Illinois crop decreased 56 per cent. (The Illinois wheat is nearly all raised south of the Northwestern's lines.) Corn in Northern Illinois (on the Northwestern's lines) was not far below an average crop last year, while in the state as a whole the crop decreased 27 per cent. Still the crops were not good. It was the rapid growth of the country on the road and beyond it, and the consequent demand for lumber and other supplies, the great consumption of iron ore, and the general activity in business that caused the improvement in traffic over 1880-81. The fiscal year, it should be remembered, included seven months of 1881, which are the months in which the corn crop of 1880 was chiefly marketed, and a little of the wheat crop of that year. The hard winter and late spring had compelled the postponement of the marketing of crops in the Northwest till an unusually late day, as was shown by the extraordinary receipts of grain at the lake markets in June, and also by the enormous earnings of the road in that month—38 per cent. over the corresponding month of 1880, which was a very good month.

Comparing with the previous year, with an increase of 14.7 per cent. in the average mileage worked, there was an increase of 25 per cent. in passenger traffic and of 21.6 per cent. in freight traffic, so that there was a large increase in the average traffic per mile, in spite of the large addition of new road. There was scarcely any change in the average rates received, so that the increase in earnings from this traffic was nearly the same as the increase in traffic, and the gross earnings from all sources increased $4,350,584, or 22½ per cent. The increase in expenses (comparing with the year which contained the terrible winter of 1880-81) was $2,213,813, or 21.2 per cent., and the increase in net earnings was $2,136,771, or 24 per cent. As the fixed charges meanwhile increased but $536,198, there remained as the stockholders' profits $1,600,573, or 42⅛ per cent. more than the year before—truly an enormous gain.

The average mileage worked, the traffic and the average rate in cents per ton and per passenger mile for nine successive years have been :

Year to May 31.	Miles worked.	Passenger miles.	Ton miles.	Rate per mile. Pass.	Ton.
1874	1,923	109,134,533	461,412,039	3.40	2.40
1875	1,990	116,779,137	454,550,357	3.00	2.12
1876	1,992	122,281,308	503,132,389	2.85	1.95
1877	1,993	116,902,435	485,357,900	2.89	1.86
1878	2,037	118,877,406	623,768,593	2.83	1.72
1879	2,129	116,068,482	681,878,311	2.79	1.56
1880	2,216	140,116,884	865,909,542	2.67	1.49
1881	2,644	164,333,508	980,522,774	2.53	1.47
1882	3,033	205,574,178	1,192,188,039	2.52	1.47

The passenger traffic, it will be seen, first increased in 1879-80, but by far the larger increase was made last year, and this doubtless was very little due to the increased mileage, the new road having very light passenger traffic, but to greater general activity, and especially to immigration. Freight traffic began to grow in 1877-78, and has continued since, but at very different rates—28 per cent. from 1877 to 1878, 9 per cent. from 1878 to 1879, 27 per cent. from 1879 to 1880, 13 per cent. from 1880 to 1881 and 25 per cent. from 1881 to 1882. With the gain of 52 per cent. in mileage since 1877 there has been an increase of 76 per cent. in passenger mileage, and of 145 per cent. in freight traffic, so that in spite of a reduction of 13 per cent. in the average passenger rate and of 21 per cent. in the average freight rate, there has been an increase from $2,763 to $3,642 in the net earnings per mile of road.

The gross and net earnings, working expenses, fixed charges, and profits *per share of stock* over fixed charges have been for seven years :

Year to May 31.	Gross earnings.	Expenses.	Net earnings.	Fixed charges.	Profit per share.
1876	$14,013,732	$8,274,290	$5,739,442	$4,713,327	2 81
1877	13,033,102	7,526,101	5,507,001	4,578,659	2.54
1878	14,751,063	7,620,946	7,130,117	4,665,630	6.75
1879	14,580,921	7,707,649	6,873,272	4,585,644	6.27
1880	17,349,349	8,431,600	8,917,749	4,837,581	11.18
1881	19,344,072	10,425,821	8,908,251	5,130,749	10.28
1882	23,684,656	12,639,634	11,045,022	5,606,947	14.44

This growth in earnings has been chiefly in the last three years. A comparatively small increase in them in 1878, with little increase in expenses, was sufficient to increase the profits per share from $2.54 to $6.75. The share capital being but $11,140 per mile of road worked, it requires an addition of but $111 per mile of net earnings to equal $1 per share.

The position of this company is likely to be greatly strengthened by the good crops promised in Minnesota, Northwestern Iowa and Dakota this year. This is not because these crops will make a very important addition to the earnings, but because they are almost sure to stimulate the rapid settlement of the country where this company's new lines are. This is vastly more important to it than a growth of earnings for a year. When the country on these lines is fairly occupied they will contribute largely every year—in bad years as well as good years—to the profits of the company, as their traffic will much of it pass 300 to 600 miles over older lines of the company. There is no doubt that this country will eventually be fully occupied, but the time within which this will be accomplished depends very much upon the crops. If the settlers who have come in during the past three years prosper, they will be followed immediately by a great many others, and in a very short time the land will be generally occupied. Last year was not a very prosperous one to the new settlers, and though there has been a very considerable influx this year, it has been small in comparison with that to Manitoba and the country on the lines of the Northern Pacific and the St. Paul, Minneapolis & Manitoba. But the good crops this year are almost sure to increase the current of settlers to the lines south of the Northern Pacific, and may have the result of hastening by two or three years the time when the new roads there develop a good traffic. There are lines in Southwestern Minnesota which waited nearly ten years for that time to arrive, when if crops had been good for two or three seasons after they were first opened, they would hardly have had to wait any longer.

Estimating Crop Prospects.

The proverb that we easily believe what we wish to be true receives a striking illustration in the opinions on crop prospects. The bulls in stock see everything rose-colored. Everything is favorable. The yield of everything is the greatest ever known, and the quality unsurpassed. But while nature has been thus favorable here, it has frowned on Europe, and the demand will be such as to take all our immense surplus at high prices. The only difficulty the railroads will have to contend with will be providing rolling stock enough to carry the immense traffic. Quite the contrary with the bulls in grain, provisions and cotton, and the bears in stocks. The last thunder shower has ruined the ripened grain, and drowned out the growing corn. Europe will be able to supply itself, and the railroads will quarrel for what little there is to carry and make rates less than cost; result, bankruptcy in the near future. Every favorable event is remembered by one class; every unfavorable one by the other. All reports favoring one view are dwelt upon, and all others ignored so far as possible. The Agricultural Department, compiling the information received from thousands of correspondents in every corner of the country, announces that the acreage of spring wheat is 12 per cent. less than last year ; a railroad officer rides across two or three states and tells a reporter there was never so much sown before. The bull in stocks notes and remembers the latter and ignores the former, and so do many newspapers which have committed themselves in favor of a great "boom" in business. A little more than a year ago a New York newspaper which had been insisting that the "granger" stocks were extravagantly high, would have it that the winter-killing of wheat had spoiled the next year's business for these roads · the fact being that at that time wheat had not been sown on the granger roads, where spring wheat is the crop. The [same newspaper later in the year, when it was sure that stocks were too low, insisted for months after harvest that the crops of 1881 were equal to any ever known ; the fact being that there was a decrease of nearly 25 per cent. in wheat, and of 30 per cent. in corn compared with 1880. and a great one in cotton also. In this case there was probably a little wilful lying ; but in nearly all the newspaper and individual estimates a great deal must be allowed for the "personal equation," as well as a great deal for incompleteness of returns and ignorance of statistical methods. Thus, probably nine-tenths of the newspapers in the country would estimate that a decrease of 10 per cent. in the wheat acreage of Illinois would be balanced by an increase of 15 per cent. in Dakota ; whereas, Illinois last year had about five times as many acres of wheat as Dakota. And a large proportional increase of corn in half a dozen Southern states, like the six Gulf states, that together produced 153,000,000 bushels in the favorable year 1880, is gravely set against the production of Indiana, Illinois, Iowa and Missouri, which in the same year produced 760,000,000 bushels, and in 1879, 918,000,000 bushels, against 112,000,000 in the six Gulf states.

Fullness of returns—that is, returns representing all parts of the country—is one requisite to an approximately accurate estimate; but with these, we must have knowledge of the relative amount of crops in the different parts of the country to enable us to make any good use of them. There is room enough for error in the original estimates of the local observers; these are multiplied several times in the application by the ordinary newspaper statistician ; and when we introduce the personal element of a commentator interested in finding the result good or bad, and faith in the observations or statements of a single individual as to the crops of a whole state or section, we cannot put much trust in the estimates. Indeed, unless the indications and reports are overwhelmingly in one direction, we can put no confidence at all in what we see in the newspapers as estimates *for the whole country*. Some journals collect information from limited districts very fully and compile it intelligently, as, for instance, the St. Paul *Pioneer-Press* for Minnesota and Dakota; but generally the larger the area covered, the less confidence can we place in estimates which the newspaper makes for the average condition or the aggregate crop, and largely from neglect to consider the various acreages and conditions in different parts of the districts reported on. It is this which gives the Agricultural Department an immense advantage. Whatever errors it may commit, it is not likely to balance an increase of 10 per cent. in the corn acreage of Minnesota (amounting to 51,000 acres) with decrease of 10 per cent. in Iowa (amounting to 671,000 acres).

The chief use of crop estimates, doubtless, is to fix prices, though the fixing of prices itself may be said to be merely gauging the flow of exports in accordance with the supply to be marketed. If the farmer has but little surplus, the price is set so high that only what he can spare is drawn off; if a large surplus, the price is lowered so that the market may take the whole.

On this account, nothing reflects so perfectly the expert judgment of the prospect of the crops and of the demand for them as the prices for "futures." These prices are fixed by traders, whose business consists in dealing with the several staples, and whose success depends upon the accuracy of their judgment. They take the greatest pains to keep themselves informed, and the prices they make represent the prevailing judgment of the trade at the time.

Comparing the New York prices at this time (Aug. 9) this year and last we have the following:

	1882.	1881.
Wheat, No. 2 red, bu., October delivery	$1.16	$1.34
Corn, October delivery	0.86	0.64½
Mess, pork, bbl., October delivery	22.00	18.00
Cotton, lb., December delivery	0.11⅞	0.10½

Unless a great change in the demand is expected, these prices argue that the people who buy and sell the crops expect a much greater supply of wheat than they expected at this time last year, but a very much smaller supply of corn, and a considerably smaller one of pork and cotton. It should be said, however, that though the corn did not promise well at this time last year, the full extent of the injury to it was not yet known, nor had it occurred, there still being a chance then for a tolerable crop. At the beginning of September, when the damage was done, the price for October delivery was 74 cents, and for November delivery 76½, while now for delivery in November the price is about 82, and for delivery at any time this year it is 79. It would appear then that the traders contemplate a decidedly short corn crop this year, since they offer more for the grain than they would pay last year, after the crop was known to be very poor.

There is no prospect yet of an unusual foreign demand for grain this year. The crops abroad seem likely to be a least an average. But the short wheat crop in this countr was of itself enough last year to make the price high an there is very little corn grown for market out o th country, so that our crop makes the price.

The effect of last year's short corn crop will be felt in the price all the year, however. Ordinarily not much new corn gets to the Eastern markets before January, and by that time, doubtless, the stocks will be greatly reduced, compared with previous years ; so that not all of the advance in price is due to the prospects of the crop now growing. The Chicago price for corn delivered at any time this year was 67 cents last Tuesday, an extremely high rate, which will permit 60 cents to be paid for it in the interior of Illinois, and probably more than 50 cents at Missouri River points. The effect of this high price on the parts of the country which promise a large surplus, like Kansas, Ne-

braska, and parts of Western Iowa, should be allowed for, as well as the effect of the light yield expected (if prices mean anything) further east. The very smallness of the aggregate crop will be a decided advantage to this trans-Missouri country, which seems to be extraordinarily fortunate this year.

During the past week the weather was generally favorable to corn in the great corn-growing states, and it has doubtless considerably improved in condition, without by any means promising a full crop. The wheat in the shock in Michigan and Northern Ohio has been considerably damaged by rains, which will not lessen the quantity much, but will injure the quality. In the spring wheat country little harvesting (except in Nebraska) is done yet: but the weather has been generally favorable, with the exceptions that always occur. The St. Paul *Pioneer-Press* estimates, from present prospects, an average yield of about 15 bushels an acre in Minnesota and Dakota, ranging from 10 to 25 bushels in different localities, and largest, as usual, in the northern counties. Last year the average was 11.4 bushels in Minnesota. The Indiana state authorities estimate the wheat crop in that state (harvested) at 47,000,000 bushels, an average yield of 17.7 bushels per acre. Last year its crop was 31,350,000 bushels, from a larger acreage, the yield being but 10.8 bushels per acre.

Floating Debts and Assets.

In commenting on the report of the Chicago & Northwestern Railway Company in its financial columns last Tuesday, the New York *Tribune* says that "a serious drawback to the splendid show of surplus * * is found in the company's general balance sheet, by which it appears that, notwithstanding a surplus for the year of $2,791,437, the company's floating debt on May 31, 1882, was $1,264,118." It then gives what it calls "all the cash items of assets and liabilities" in the balance sheet, and finds the sum of the liabilities $4,306,758, against $3,042,640 of assets.

In the liabilities are included the accrued and unpaid supply bills, pay-rolls and balances due other roads, and also the dividends declared, and the interest and rentals accrued but not yet due. In the assets are included only cash and accounts payable in cash.

These may be all the cash assets, but they do not by any means show that the excess of liabilities is a floating debt unprovided for. The balance sheet shows, besides these items, one of $2,291,340 for materials and fuel on hand. These are assets costing money and being turned into earnings every day, as consumed in the operation of the road. If the company had suspended operations at the close of the fiscal year, it would have had these materials to sell, and the proceeds would have gone towards extinguishing the liabilities, and instead of there being a deficit of $1,264,118 in the "floating assets"—the working capital of the enterprise as distinguished from its fixed capital—there would have been a *surplus* of $1,027,222. It is difficult to see how the "floating debt" which the *Tribune* finds a "serious drawback" could be got rid of unless by keeping a million or more of money idle in the bank all the time for a month before it is wanted. The interest and dividends are not due, and the pay-rolls and supply bills cannot be reached for some time, and before then more money will have been earned, and there are two or three months' supplies on hand. These latter are as much available assets as the stock of cotton in a factory; they would have to be bought if they were not on hand, and they are turned into money every day by being manufactured, as it were, into transportation and sold. And if the supplies were materials for new construction, they still represented money, and were an asset good against supply bills and pay-rolls, as much so as a merchant's or manufacturer's stock.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Buffalo, Pittsburgh & Western.—Extended from Dunkirk, N. Y., northeast to Silver Creek, 9 miles.

Chesapeake & Ohio.—Extended from Newport News, eastward 6 miles.

Chicago, Milwaukee & St. Paul.—Track laid on the *Cannon River Branch* from Northfield, Minn., to Waterford, 3 miles.

Denver & Rio Grande.—Track laid on the *Utah Extension* from Gunnison, Col., westward 35 miles.

Little Rock, Mississippi River & Texas.—Track on the *Onachita Division* is extended from Monticello, Ark., west to Warren, 17 miles.

Norfolk & Western.—Track is laid on the *New River Division* from New River, Va., northward 15 miles.

Northern Pacific.—Track laid on the *Little Falls & Dakota Branch* from Little Falls, Minn., west by south to Sauk Center, 36 miles.

Salt Lake & Western.—Extended from Boulder, Utah, westward to Tintic, 14 miles.

Sioux City & Pacific.—The *Nebraska Division* is extended westward to Thatcher, Neb., 5 miles.

Texas & St. Louis.—Extended from McGregor, Tex., southwest to Leon River, 12 miles. Gauge, 3 ft.

Union Pacific.—On the *Oregon Short Line* track is laid to a point one-hundred and thirty-two miles west by north from Granger, Wy., an extension of 30 miles. Also from Pocatello, Idaho, has been extended west to American Falls, 12 miles.

This is a total of 194 miles of new railroad, making 5,473 miles thus far this year, against 3,115 miles reported at the corresponding time in 1881, 2,631 miles in 1880, 1,273 miles in 1879, 947 miles in 1878, 845 miles in 1877, 1,145 miles in 1876, 594 miles in 1875, 913 miles in 1874, 1,966 miles in 1873, and 3,372 miles in 1872.

CHICAGO RAIL SHIPMENTS EASTWARD for the week ending July 29 for the past three years have been:

	1880.	1881.	1882.
Years	34,371	59,370	19,634

Thus the shipments this year were but one-third what they were last, and were 40 per cent. less than in 1880. The shipments this year were also 3,154 tons (14 per cent.) less than the week before, and were the smallest that have been made in the time that the records have been kept—since 1878. Partly estimating this year's business, the July shipments for four successive years, and the shipments for the seven months ending with July have been:

	1879.	1880	1881.	1882.
July	145,788	160,187	259,253	94,440
Seven months	1,633,930	1,344,766	1,628,789	1,190,169

The shipments were swelled in 1879 and 1881 by low cut rates, which diverted traffic from the lakes, but the decrease of 40 per cent. since 1880 is caused solely by a decrease of the total amount of freight to be moved, as the rate this year was 5 cents per 100 lbs. lower. The receipts from these Chicago shipments must have been about in the proportion of $204 in 1880 and $165 in 1881 to every $100 this year. July, it should be remembered, belonged to the last crop-year; at Chicago the new crop was but little felt then, and it will not be strongly felt there until September, when the new spring wheat begins to come forward. The smallest shipments in any month previous to last July were 115,322 tons last May.

For the seven months ending with July the shipments this year were 438,620 tons (27 per cent.) less than last year, 154,597 tons (11½ per cent.) less than in 1880, and 443,761 tons (27 per cent.) less than in 1879, when the shipments for the seven months were nearly the same as last year. This year includes the months of largest and smallest shipments yet recorded.

Of the shipments of the week ending July 29 the Chicago & Grand Trunk carried 3.5 per cent., the Michigan Central 22, the Lake Shore 17.2, the Fort Wayne 34.9, the Panhandle 7.9, and the Baltimore & Ohio 14.5 per cent. Thus the two Vanderbilt roads had 39.2 per cent. of the whole and the two Pennsylvania roads 42.8. The share of the Chicago & Grand Trunk is phenomenally small; that of the Baltimore & Ohio much larger than usual.

For the week ending Aug. 5 the shipments eastward billed at Chicago (not including those from points west billed through Chicago) were 19,269 tons, against 49,028 tons in the corresponding week of last year, and 19,309 tons in the previous week of this year. Though there is a decrease of 40 tons from the previous week, the shipments still are larger than in any other week for seven weeks. Of the total decrease of 29,759 tons from the previous year, 18,848 tons were grain and 6,970 were flour. But there is also a decrease of 38 per cent. in provisions. Several establishments which usually pack heavily in the summer have this year closed for want of hogs.

CHICAGO, BURLINGTON & QUINCY NET EARNINGS as reported for June show the enormous decrease of $604,890, or 54 per cent., from the net earnings of June last year. This is due almost wholly to a decrease in gross earnings, the working expenses having increased but $8,252—less than 1 per cent.

The conclusion that might be drawn from this alone as to the general prospects of the road would be grossly erroneous. The immense difference is due to the fact that June was an extraordinarily favorable month last year and an extraordinarily unfavorable one this year (for June). In 1881 June earnings were $517,377 (34 per cent.) *above* the average of the half year; in 1882 they were $93,760 (6 per cent.) *below* the average. Last year the bad weather earlier forced back the marketing of produce till June; this year the light crops had chiefly gone out before that month. It is seldom that so great a change occurs in corresponding months of successive years. That the great decrease of June was an exception may be known by the fact that in spite of it for the half-year ending with June there is an increase of $57,068 (⅝ per cent.) in gross earnings, and the decrease in net earnings was but $267,431, or about one-half the decrease in net earnings in June.

The Chicago, Burlington & Quincy is a great corn road, and a very large proportion of the corn is usually marketed in the summer months. It and the other roads which carry much corn, such as the Rock Island, the Illinois Central, and the Chicago & Alton, are likely to feel this lack of corn to carry in July, August and September as well as in June, though not so much probably, because last year the June shipments were exceptional. But before this time they have begun to feel the winter-wheat shipments, which last year were light, and the Burlington will by next month be carrying the heavy spring wheat crops of Nebraska, which will tend to offset the lack of corn. And taking the crop year as a whole, there is no doubt that there will be much more of everything than last year in the district which this road serves: though the corn crop may be much less than an average, it still promises to be much larger than last year.

JULY EARNINGS so far reported show an increase of about 9 per cent., while there has been an increase of 12¼ per cent. in mileage. The average earnings per mile decreased from $506 to $490. Many Northwestern roads reporting are not likely to show any considerable improvement in earnings until the spring wheat begins to come forward, but lines south of Chicago are already showing the effect of the winter wheat movement and will probably reflect it decidedly in their August earnings. But it must be remembered that these same roads had much corn to carry last year, and can have but little now until near the end of the year, however the crop may turn out.

THE GRAIN MOVEMENT shows a marked decrease since July, the Northwestern receipts for the first week of August (so far as reported) being about a third less than in the last week of July. The high prices made by a "corner" in July seemed to stimulate shipments then. Still the receipts of wheat are very large—would have been very large in any year; but the corn receipts are extremely small, and at this time they are usually very large. Baltimore continues to feel the new crop more than any other place, showing some increase last week over the week before, and Philadelphia also shows a considerable gain over earlier weeks. They profit most by the movement of winter wheat, and as there is little corn to be moved, they may be expected to compare very favorably with New York until the spring wheat begins to come forward, or even longer.

CANAL RATES have advanced slightly during the past week, and are now reported as 5½ cents a bushel for corn and 5¾ for wheat from Buffalo to New York. Lake rates are unchanged at 2¾ cents for corn and 3 for wheat from Chicago or Milwaukee to Buffalo. The shipments are nearly all wheat now. Ocean rates have fallen off, late quotations being 4¾d. per bushel from New York to Liverpool by steam.

NEW PUBLICATIONS.

A Few Remarks on Railroad Accidents: by Clement E. Stretton. Third edition. London: Simpkin, Marshall & Co.

This pamphlet is largely a compilation of articles written by the author for the *English Mechanic* and the *Railway Engineer*. The first chapter contains a summary of the action of the British Parliament on the matter of railway accidents, and of the causes of such accidents as indicated by the Board of Trade reports. Chapter II. is a brief history of railroad brakes and their introduction on British railroads, and an account of the Board of Trade regulations, of the experiments made and of the general contest over rival brakes which has now been carried on for so many years in Great Britain. Chapter III. is devoted to the responsibility of "railway servants" under the law for accidents caused by their mistakes. It would be well for some American railroad managers and others to read this chapter. The author says that "it has always been the custom, whenever an accident happens, for the companies to try to place *all the blame* upon some servant, in order that he may be punished, and that the responsible officers who are really to blame for neglecting to provide proper appliances may escape scot free." A very flagrant example of this is mentioned of a "driver" of an engine which came into collision with a standing train on the Caledonian Railway, chiefly in consequence of the Clark & Webb chain brake *failing to act when required*. The man, who had for 33 years held an unimpeachable character for carefulness, attention to duty, and sobriety, was tried and actually sentenced to four months' imprisonment. The author of the pamphlet and others interested themselves in his case and had the term commuted to two months, and ultimately he was reinstated as an engine-driver. It seems to be the general impression here, as well as in England, that if an accident is caused by an innocent mistake, the person who made it ought to be punished by imprisonment. It should be kept in mind, as pointed out by the Justice at the Leeds Assizes, that "an error of judgment, a simple mistake, or an accident, is not sufficient to sustain an indictment of 'manslaughter.' Before such a verdict can be returned it is necessary that the negligence shall be of that serious character known as gross, culpable, or criminal negligence."

Chapter IV. of Mr. Stretton's pamphlet is a description of the Sykes' system of signals, which is an electrical combination of the block and interlocking apparatus, which has been introduced into this country.

The remaining portion of the book gives Westinghouse's diagram for calculating the efficiency of brakes in stopping trains, a description of the distinguished brake, some comments on universal brake couplings, stoppages of traffic by accident and the relative number of first, second and third-class passengers on British railroads.

The pamphlet treats of a subject on which it is possible to make a very excellent book and one which is much needed. Mr. Stretton's work is, however, very incomplete, fragmentary and what might be expected from putting together a number of newspaper articles.

Transportation in Congress.

In the Senate on the 4th:

The following measures were passed: House bill, granting the right of way to the Fremont, Elkhorn & Missouri Valley Railroad Company across the Niobrara Military Reservation in Nebraska, and restoring portions of the reservation to the public domain. Senate bill for a bridge over the St. Croix river, between Calais, Maine, and St. Stephen, New Brunswick.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings will be held as follows:

Boston & New York Air Line, special meeting, in Middletown, Conn., Sept. 13, to vote on the proposed lease of the road to the New York, New Haven & Hartford Company.

Rochester & Pittsburgh, special meeting, at the company's office in New York city, Aug. 28, at 2 p. m., to vote upon the question of issuing $5,000,000 additional stock.

Railroad Conventions.

The *American Institute of Mining Engineers* will hold its summer meeting in Denver, Col., beginning Aug. 19.

The *National Association of General Passenger & Ticket Agents* will hold its next meeting, pursuant to adjournment, in Montreal, Sept. 19.

The *Master Car-Painters' Association* will hold its annual convention in Chicago, beginning Sept. 20.

The *Master Car-Builders' Association* will meet in convention, pursuant to adjournment, on Oct. 10, at Niagara Falls.

Dividends.

Dividends have been declared as follows:

Cleveland & Pittsburgh, (leased to Pennsylvania Company), 1¾ per cent., quarterly, payable Sept. 1. Transfer books close Aug. 10.

Kansas City, Ft. Scott & Gulf, 4 per cent., semi-annual, on preferred stock, payable Aug. 15.

Richmond & Danville, 2 per cent., quarterly, payable Aug 15. Transfer books close Aug. 11.

Foreclosure Sales.

The *Galveston, Houston & Henderson* road was sold in Galveston, Tex., Aug. 1, under foreclosure of the first mortgage, and bought for $460,000 by James A. Baker, Agent for Jay Gould and Russell Sage, trustees. The sale was made subject to receiver's debts and other liens amounting to about $375,000. The road extends from Galveston, Tex., to Houston, 50 miles, and is important as the link connecting the railroad system of Texas with its chief seaport. The bonded debt amounted to $1,500,000. The sale cannot be confirmed until the fall term of the Court.

The *Texas Trunk* road was sold at sheriff's sale in Dallas, Tex., Aug. 1, and bought for $2,500 by D. R. Sortwell, of Boston, and associates. In addition to the nominal price paid the purchasers assume liens amounting to about $90,000. The road is completed from Dallas to Kaufman, 35 miles.

The *Muncy Creek* road was sold in Hughesville, Pa., Aug. 9, by the trustees under the mortgage, and bought for $5,000 by the agent of the bondholders. The road extends from Hall's, Pa., to Hughesville, 6½ miles. The bonded debt is reported at $180,000.

Master Car-Builders' Association—Committee on Car Wheels.

Mr. Adams, of the Boston & Albany Railroad, has been appointed Chairman of the Committee of the Master Car-Builders' Association to report on the cost of service of steel-tired wheels as compared with chilled cast-iron and paper wheels, requests master car-builders to send him reports of the service of car-wheels, and any other information which may be of assistance to him in making a comparison of their relative cost and safety. His address is F. D. Adams, Allston, Mass. As the October meeting is only two months off, the more promptly such reports are sent, the greater will be their usefulness to the committee.

ELECTIONS AND APPOINTMENTS.

Atlanta & West Point.—The following circular, dated July 25, announces officially a change already noted:

"Mr. W. P. Orme having declined a re-election as Secretary and Treasurer of this company on account of ill health, Mr. D. W. Appler has this day been elected to fill these offices. All communications appertaining to the Secretary and Treasurer's departments of this company will hereafter be addressed to the latter."

Bradford & Oil City Air Line.—The directors of this new company are: Nathan Bushnell, J. M. Fuller, Thomas J. Melvin, A. I. Wilcox, Bradford, Pa.; Wm. Dent, Brookland, Pa.; A. N. Cole, Wellsville, N. Y.; Cornelius S. Bushnell, New Haven, Conn.; C. H. Bush, Westfield, Mass.; D. D. Warren, Springfield, Mass.

Chicago, Milwaukee & St. Paul.—Mr. George H. Heafford has been appointed Assistant General Passenger Agent. He was recently General Eastern Agent of the Cleveland, Columbus, Cincinnati & Indianapolis, and was at one time on the Missouri Pacific, but received his training largely in the general offices of the Chicago & Northwestern.

Denver & Rio Grande.—The office of Mr. A. B. Garner, Purchasing Agent, has been removed from Colorado Springs to Rooms 1 and 2, Union Depot, Denver, Col. All invoices, bills of lading, etc., and correspondence pertaining to business with his department should be addressed accordingly.

Indiana, Bloomington & Western.—Mr. Ford Woods has been appointed Assistant General Freight Agent, with office in Springfield, O., and will have charge of the freight traffic of the Ohio Division.

Middletown & Crawford.—At the annual meeting, last week, the following directors were chosen: R. M. Crosby, Samuel Robeson, Alexander Thompson, Crawford, N. Y.; Albert Bull, E. M. Madden, H. R. Wilcox, Middletown, N. Y.; Thomas C. Platt, Owego, N. Y.; George R. Blanchard, E. S. Bowen, Robert Harris, H. J. Jewett, A. R. Macdonough, B. W. Spencer, New York. The board elected H. J. Jewett President; G. R. Blanchard, Vice-President; B. W. Spencer, Treasurer; E. S. Bowen, General Superintendent. The road is controlled by the Erie.

Milwaukee & Northern.—The full list of the officers of this road, which was worked by the Wisconsin Central up to Aug. 1, is as follows: President, Guido Pfister; Vice-President, James C. Spencer; Secretary, E. Warriner; Treasurer, John C. Spencer; Auditor, Robert Toombs; General Superintendent, C. F. Dutton; General Freight Agent, J. J. Colman; General Ticket Agent, F. P. Reagan; Master Mechanic, H. M. Aldrich; Road-Master, J. H. James; Train Despatcher, F. D. Tucker.

Missouri Pacific.—Mr. J. B. Wadleigh has been appointed Division Freight Agent of the lines in Texas, with headquarters at Fort Worth, and will have direct charge of the freight business originating at points south of Texarkana and Denison.

Ohio Southern.—Mr. David R. Ennis, late Assistant Superintendent, has been appointed Superintendent, with office in Springfield, Ohio.

St. Johnsbury & Lake Champlain.—At the yearly meeting in St. Johnsbury, Vt., Aug. 9, the old directors were re-elected, except Wm. P. Fairbanks was substituted for Wm. H. Rhawn, who declined a re-election. The board elected Horace Fairbanks President; Franklin Fairbanks, Vice-President; Wm. P. Fairbanks, Secretary and Treasurer.

Silver City, Deming & Pacific.—Mr. J. P. Whitney, of Boston, is President of this company. Mr. E. G. Shields is Chief Engineer, with office at Silver City, New Mexico.

Southeastern, of Canada.—The board has elected Bradley Barlow President; Duncan McIntyre, Vice-President; A. B. Chaffee, Secretary and Treasurer. Mr. McIntyre is Vice-President of the Canadian Pacific Company.

Southern Pacific Leased Lines.—At the annual meetings in San Francisco last week, the following officers were chosen for this company's leased and controlled lines: *Los Angeles & San Diego*—Directors, Leland Stamford, Charles F. Crocker, N. T. Smith, J. L. Willcutt, E. H. Miller, Jr.; N. T. Smith, Treasurer; J. L. Willcutt, Secretary. *Market Street.*—Directors, Leland Stanford, Charles Crocker, C. P. Huntingdon, N. T. Smith, J. L. Willcutt; President, Leland Stanford; Vice-President, Charles Crocker; Secretary, J. L. Willcutt; Treasurer, N. T. Smith. *Mission Bay Bridge.*—Directors, Leland Stanford, Charles Crocker, C. P. Huntingdon, J. L. Willcutt, N. T. Smith; President, Leland Stanford; Vice-President, Charles Crocker; Secretary, J. L. Willcutt; Treasurer, N. T. Smith. *Monterey.*—Directors, Charles Crocker, Charles F. Crocker, W. V. Huntington, J. L. Willcutt, N. T. Smith; President, Charles Crocker; Vice-President, Charles T. Crocker; Secretary, J. L. Willcutt; Treasurer, N. T. Smith. *Potrero & Bay View.*—Directors, Leland Stanford, Charles Crocker, W. V. Huntington, J. L. Willcutt, N. T. Smith; President, Leland Stanford; Vice-President, W. V. Huntington; Secretary, J. L. Willcutt; Treasurer, N. T. Smith.

Stockton & Amador.—The directors of this company are: Frank T. Baldwin, E. S. Holden, R. K. Reid, E. R. Stockwell, T. C. Walker. The office is in Stockton, Cal. The officers are: E. S. Holden, President; Frank T. Baldwin, Vice-President; R. K. Reid, Secretary.

Topeka, Salina & Western.—Mr. Thomas Appleton is appointed Acting Chief Engineer, with headquarters at Topeka, Kan. He was recently Chief Engineer of the Leavenworth, Topeka & Southwestern road.

PERSONAL.

—Mr. W. F. Ellis has resigned his position as Chief Engineer of the Connotton Valley road.

—Mr. E. W. Poorman, Master Mechanic of the Connotton Valley Railroad, has resigned his position.

—It is reported that Col. A. W. Soper, formerly General Superintendent of the St. Louis, Iron Mountain & Southern, and now General Manager of the Wagner Sleeping Car Company, has been offered the management of the Texas & St. Louis road.

—Mr. E. H. Winans, an old business man and contractor, died in Adrian, Mich., Aug. 4. He was born at Catskill, N. Y., in 1800, and came to Michigan in 1837. He built the first sections of the Michigan Southern Railroad from Monroe to Hillsdale, and also a portion of the Michigan Central.

—Mr. Jonathan Godfrey, for many years a merchant and manufacturer well known in New York and Connecticut, died at his home in Southport, Conn., Aug. 3, aged 84 years. He was one of the first directors of the New York & New Haven Company, and served in the board for 16 years.

—Col. George N. Perkins, of Norwich, Conn., for 40 years Treasurer of the Norwich & Worcester Railroad, was 94 years old on Saturday. In spite of the fact that he has been in active service for about 75 years, Colonel Perkins is daily at his office, and works with the faithfulness and accuracy of a man of middle age.

—Mr. H. G. Angle, formerly of Cedar Rapids, I., who has been living at the Grand Pacific Hotel with his family for some months, died of hemorrhage of the lungs Aug. 6. Mr. Angle was known as a railroad contractor, and as the inventor of a compound rail, which he never succeeded in introducing, in spite of his very energetic efforts.

—Mr. Robert S. Hollins, who died at his residence in Baltimore, July 31, aged 85 years, was born in England, but came to Baltimore at an early age. He was chosen Secretary of the Northern Central (then the Baltimore & Susquehanna) Company in 1835, and continued to hold that office until 1877, when he resigned on account of his advanced age.

—Gen. Gouverneur K. Warren died in Newport, R. I., Aug. 8, aged 52 years. He graduated from West Point in 1850, and from that time until his death served in the Engineer Corps of the United States army, except for four years during the war, when he was in the field as Colonel, Brigadier General and finally Major General of Volunteers. General Warren had been employed at different times on the surveys of the Mississippi, the Missouri and other rivers; in the construction of the Rock Island bridge over the Mississippi; on the commissions on the St. Louis Bridge, the Newport & Cincinnati Bridge over the Ohio and the International Bridge at Buffalo. He was also one of the commission to examine the Union Pacific road after its completion.

TRAFFIC AND EARNINGS.

Southwestern Railway Association.

Commissioner J. W. Midgley, of the Southwestern Railway Association, has just issued the following circular in regard to actual and estimated weights:

"The attention of agents and others is again called to the rule adopted by the roads in this Association in regard to the weight at which freight should be way-billed. Reference is especially had to business destined to the Missouri River and beyond which originates east of the Mississippi River and Chicago.

"Weights shown on the way-bills of connecting roads must not be accepted unless they are known to be correct. Whenever the actual weight of car-lots of agricultural implements or wagons is not ascertained from the track scales at the point of reception by the roads in this Association, such cars will be billed out at 28,000 pounds per car. In the case of car-lots of other freight, when not weighed from any cause, the estimated weights will govern. The cars should then be weighed at the terminal stations on the Missouri River, and proper corrections made. Gross weights will be charged on canned goods, coffee, sugar, syrup, molasses, etc. The contents of cars containing beer, soap, and other package freight should be ascertained by careful examination and count before the cars are delivered to connecting lines or are switched to side tracks for consignee."

Texas Passenger Rates.

On Aug. 1 the new Texas law, limiting passengers to three cents per mile, went into effect. The law is very stringent in its terms, prescribing a penalty of $50 for every overcharge, no matter how small the amount. The companies generally are complying with the law and making their rates to correspond as closely as possible, although the fractional rates will cause some trouble, as five-cent pieces are the smallest coins in general circulation in Texas. Some of the roads are arranging for a supply of one-cent pieces.

It is understood that most of the lines will do away with all excursion, mileage and other special tickets, and will charge only the uniform three cents a mile.

St. Louis Bridge.

During the month of July there passed over the St. Louis Bridge 15,000 passenger cars: 22,931 freight cars, of which 14,127 were loaded and 8,804 empty; 27,000 cars of gravel, etc., for construction purposes; total, 64,931 cars, an average of 2,095 cars a day.

New Mexico and Arizona Freight Rates.

The Atchison, Topeka & Santa Fe Company announces a reduction in rates from the Missouri River to Southern Pacific points between Deming and Yuma of 5 cents per 100 lbs. on first, second and third classes; 2 cents on fourth, and 3 cents on fifth-class freight. This action is said to be taken in consequence of the recent change by which Council Bluffs and Kansas City rates were made the same as Omaha rates.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Seven months ending July 31:				
Atch., Top. & S. F.	$7,887,718	$6,402,839	I. $1,484,879	23.2
Bur., Ced. R. & No.	1,489,674	1,171,383	I. 318,291	27.2
Central Iowa	637,758	479,169	I. 158,589	33.1
Central Pacific	14,196,588	12,789,271	I. 1,407,297	11.0
Ches. & Ohio	1,705,950	1,521,219	I. 184,721	12.1
Chi. & Alton	4,102,287	3,922,163	I. 180,124	4.6
Chi. & Eastern Ill.	965,249	885,596	I. 79,653	9.0
Chi., Mil. & St. P.	10,605,000	8,687,507	I. 1,917,493	22.1
Chi. & Northwest.	12,551,051	11,025,755	I. 1,525,296	13.8
Chi., St. P., M. & O.	2,560,498	2,067,129	I. 493,369	23.9
Cin., I., St. L. & C.	1,419,651	1,286,413	I. 133,238	10.4
C., N. O. & Tex. P.	1,370,036	1,188,333	I. 182,703	15.4
Clev., Akron & Col.	274,917	233,122	I. 41,795	17.9
Col., H. Vy. & Tol.	1,489,722	1,231,176	I. 258,546	21.0
Denver & R. G.	3,647,430	3,104,041	I. 543,389	17.5
Grand Trunk	6,159,934	6,151,970	I. 7,964	1.3
Great Western	2,816,441	2,972,483	D. 156,042	5.2
Han. & St. Jo.	1,088,625	1,210,032	D. 121,407	10.0
H., E. & W. Tex.	143,605	78,531	I. 65,074	8.3
Ill. Cen., Ill. lines.	3,821,808	3,612,693	I. 208,115	5.8
Iowa lines	1,039,198	959,519	I. 79,679	8.3
Ind., Bloom. & W.	1,358,507	1,345,773	I. 12,734	0.9
Long Island	1,201,091	1,055,232	I. 145,859	13.8
Louisv. & Nashville	7,123,049	6,294,650	I. 828,399	13.2
Mil., L. S. & West.	491,538	304,565	I. 186,973	61.3
Mo. Pacific lines:				
Central Branch	440,272	542,102	D. 101,830	18.8
Int. & Gt. No.	1,539,814	1,339,825	I. 199,989	14.9
Mo., Kan. & Tex.	3,129,661	2,779,799	I. 349,862	12.6
Mo. Pacific	3,949,587	3,601,743	I. 347,844	9.7
St L., Iron M. & So.	3,746,822	3,868,941	D. 122,119	3.2
Tex. & Pacific	2,430,039	2,060,500	I. 369,530	17.9
Mobile & Ohio	1,024,125	1,253,447	D. 229,322	18.3
N. Y. & N. England	1,848,569	1,487,818	I. 360,751	24.2
Northern Pacific	3,265,281	1,692,494	I. 1,572,787	92.9
Ohio Central	541,558	330,017	I. 211,541	63.8
Or. Ry. & Nav. Co.	2,605,800	2,183,703	I. 482,097	22.1
Net earnings	1,226,370	988,778	I. 237,592	24.0
Peoria, Dec. & Ev.	440,903	336,185	I. 104,718	31.2
St. L., A. & T. H.,				
Main Line	702,567	835,089	D. 132,522	15.9
Belleville Line	456,751	414,930	I. 41,821	10.1
St. L. & San Fran.	1,832,462	1,714,004	I. 118,458	6.9
St. P., Minn. & M.	4,484,330	2,335,798	I. 2,148,502	92.0
Scioto Valley	279,614	204,036	I. 75,578	37.0
Tol., Cin. & St. L.	509,807	341,705	I. 168,102	49.2
Union Pacific	15,400,000	13,490,000	I. 1,910,000	14.2
Wabash, St. L. & P.	8,830,085	7,359,017	I. 1,471,068	20.0
Wisconsin Central.	1,007,304	739,692	I. 267,672	26.2
Six months ending June 30:				
Chi., Bur. & Quincy.	$9,155,615	$9,098,547	I. 57,068	0.6
Net earnings	3,890,512	4,157,943	D. 267,431	6.5
St. Paul & Duluth.	390,722	294,369	I. 96,353	32.7
South Carolina	578,322	584,529	D. 6,207	1.1
Month of June:				
Chi., Bur. & Quincy.	$1,437,164	$2,033,802	D. 596,638	29.4
Net earnings	516,124	1,121,014	D. 604,890	54.0
St. Paul & Duluth.	84,780	.....	.....	.....
South Carolina	60,574	59,542	I. 1,032	1.7
Month of July:				
Atch., Top. & S. S.	$1,087,000	$1,000,633	I. 80,367	8.0
Bur., C. R. & N.	198,275	174,351	I. 23,924	13.8
Central Iowa	91,587	88,713	I. 2,874	3.2
Central Pacific	2,020,000	1,899,346	I. 120,654	6.4
Ches. & Ohio	306,831	225,096	I. 81,735	36.3
Chi. & Alton	671,537	670,205	D. 4,668	0.7
Chi. & Eastern Ill.	150,739	125,139	D. 25,600	20.5
Chi. & Gd. Trunk	135,882	99,241	I. 36,641	37.0
Chi., Mil. & St. P.	1,465,000	1,558,706	D. 103,706	6.6
Chi. & Northwest.	2,025,736	1,983,031	I. 42,705	2.1
Chi. St. P., Minn. & O	331,480	383,202	D. 51,722	13.5
Cin., Ind., St. L. & Chi	209,564	177,161	I. 32,403	18.3
Cin., N. O. & Tex. Pac	212,692	183,746	I. 28,946	15.7
Cleve., Akron & Col.	39,456	29,805	I. 9,651	32.2
Col., Hock. V. & Tol.	224,019	192,528	I. 31,491	16.3
Denver & R. G.	495,797	548,284	D. 52,487	9.6
Detroit, Lan. & No.	118,004	112,707	I. 5,297	4.7
E. Tenn., Va. & Ga.	236,339	222,769	I. 13,570	6.1
Evansv'e & T. H.	120,779	60,559	I. 60,220	98.7
G. B., Win. & St. P.	26,791	32,472	D. 5,681	17.5
Han. & St. Jo.	184,347	201,899	D. 17,552	8.7
Hous., E. & W. Tex.	21,348	12,521	I. 8,827	70.6
Ill. Cent., Ill. lines.	618,478	548,318	I. 70,160	12.8
Iowa lines	133,773	171,686	D. 37,913	22.0
Ind., Bloom. & West	206,072	199,125	I. 6,947	3.5
Long Island	279,231	243,880	I. 35,351	14.4
Louis. & Nashville	1,038,385	817,135	I. 221,250	27.1
Mil., Lake S. & W.	68,993	49,631	I. 19,362	38.7
Mo. Pacific lines:				
Central Branch	57,060	82,094	D. 24,134	29.4
Int. & Gt. No.	196,856	196,062	I. 794	0.4
Mo., Kan. & Tex.	482,334	484,576	D. 2,242	0.5
Mo. Pacific	734,008	568,507	I. 165,501	29.1
St. L., Iron M. & S.	515,519	533,512	D. 17,797	3.4
Tex. & Pacific	367,215	328,063	I. 39,152	11.9
Mobile & Ohio	136,398	135,548	I. 850	0.6
N. Y. & N. England	308,020	246,820	I. 62,100	25.1
Northern Pacific	679,240	393,200	I. 285,980	72.8
Ohio Central	85,572	55,226	I. 30,346	55.1
Ohio Southern	27,494	22,195	I. 5,299	24.1
Oregon R. & N. Co.	425,300	417,415	I. 7,885	1.9
Net earnings	228,700	227,978	I. 722	0.3
Peo., Dec. & Evans.	73,740	51,913	I. 21,82.	41.9
St. L., A. & T. H.,				
Main Line	121,847	118,844	I. 3,003	2.5
Belleville Line	70,170	46,549	I. 23,621	50.3
St. L. & San Fran.	318,613	252,333	I. 66,280	26.2
St. P., Minn. & Man.	853,296	387,488	I. 465,808	120.2
Scioto Valley	45,352	39,073	I. 6,279	16.1
Tol., Cin. & St. L.	73,661	59,268	I. 14,392	24.4
Union Pacific	2,301,000	2,526,000	D. 225,000	8.9
Wab., St. L. & P.	1,418,837	1,131,752	I. 287,085	25.3
Wisconsin Central.	79,358	77,805	I. 1,553	2.0

We are indebted to the *Commercial and Financial Chronicle's* advance sheet for a number of the figures given above.

Grain Movement.

For the week ending July 29 receipts and shipments of grain of all kinds at the eight reporting Northwestern markets and receipts at the seven Atlantic ports have been, in bushels, for the past six years:

Year.	Northwestern receipts.	—Northwestern shipments.— Total.	By rail.	P. c. by rail.	Atlantic receipts.
1877	3,591,829	2,987,721	340,916	11.4	2,474,726
1878	5,352,209	4,327,894	1,333,150	30.8	5,949,803
1879	6,702,732	4,799,103	1,670,595	34.8	7,816,854
1880	9,393,826	6,074,774	1,773,891	29.2	8,945,542
1881	6,722,873	5,095,208	2,121,597	41.6	6,537,240
1882	6,917,729	4,740,417	1,708,028	37.3	4,534,351

The receipts of the Northwestern markets for the week were very large—nearly 3 per cent. more than last year, and larger than in the corresponding week of any previous year except 1880, when they were the largest ever known in any week of any year. The increase over the previous week was 1,300,000 bushels, and over the first week of July 5,031,000 bushels, and the receipts are the largest since Sept. 10 of last year. There were only four weeks last year after harvest when these receipts were exceeded. The increase over the previous week is in wheat and oats, and the wheat receipts are larger than in 1880 even, and perhaps the largest ever known. They were chiefly at Chicago, St Louis and Toledo. The two latter places receive wheat almost exclusively, and Chicago receives little but wheat now, it coming from Kansas, Missouri, Central Illinois, and even from St. Louis itself.

The shipments of these markets were smaller than in any

corresponding week since 1878, but were a fifth more than the week before, 150 per cent. more than the first week of July, and the largest since last October. The rail shipments were very nearly as large as in 1880, and were exceeded in no other year except last year, when the rate was 40 per cent. lower. The earnings from these grain shipments must have been about at the rate of $139 this year for every $100 last. These shipments are felt most by the more southerly lines. Though a good deal of grain is received at Chicago, the rail shipments thence are small. The shipments by the Mississippi River were 365,009 bushels, or 7.7 per cent. of the whole.

The Atlantic receipts were smaller than in any corresponding week since 1877, and 28½ per cent. less than last year, and very little more than half as great as in 1880. Stocks for home consumption seem to have been so reduced that the interior is taking an unusual amount of grain now; but there has not been time yet for the large Northwestern receipts to be felt at Atlantic ports; still their receipts were 1,869,000 bushels (70 per cent.) more than the week before, and 125 per cent. more than in the first week of July, and were the largest since last September. Wheat made up 85 per cent. of the Atlantic receipts, but 57½ per cent. of the Northwestern receipts. Substantially all the corn seems required for domestic consumption, and that at places west of the seaboard, for the corn receipts at Atlantic ports were but 270,624 bushels (against 2,865,000 last year), though at the Northwestern markets they were 1,800,000 bushels.

Of the Northwestern receipts for the week, Chicago had 44.1 per cent., St. Louis 27.3, Toledo, 15.1, Cleveland, 3.9, Peoria, 3.9, Milwaukee 3.6, Detroit 1.9, and Duluth 0.2 per cent.

Of the increase of 1,302,000 bushels over the previous week, 553,000 bushels were at Toledo, 417,000 at Chicago, and 243,000 at St. Louis. The gain at Toledo is enormous, more than 100 per cent. over the previous week, and nearly 300 per cent. over its average for the first half of this year, and also larger than in any week since October, 1880. Its receipts were nearly all wheat, and doubtless nearly all came from the lines of the Wabash in Illinois and Missouri, and from Kansas and St. Louis by way of the Wabash, which has probably profited more than any other single road by this early wheat movement.

Of the Atlantic receipts, New York had 40.3 per cent., Baltimore 26.4, Philadelphia 10.6, Montreal 8, New Orleans 7.3, Boston 7.1, and Portland 0.3 per cent. All places make gains over the previous week, Baltimore 103 per cent., Philadelphia 65 per cent., Montreal 125 per cent., New York 31 per cent. New Orleans, which had *no* receipts the week before this week had 331,632 bushels, which are its largest receipts for a year, with one exception, and nine-tenths of its receipts were wheat.

Of the exports from these ports this week (3,006,951 bushels), 54 per cent. went from New York, 24.5 from Baltimore, 7.2 from Montreal, 7 from New Orleans, 6 from Philadelphia, and 1.3 from Boston. New Orleans had made no exports before for three weeks, and its exports in this week ending July 29 equal those for the *sixteen* weeks next preceding. They were nearly all wheat, and indicate the resumption of the export movement from that port, which can be conveniently reached from most of the winter-wheat country except Michigan.

For the week ending Aug. 2 exports from Atlantic ports were 3,514,388 bushels of grain and 84,070 barrels of flour, against 4,240,467 bushels of grain and 64,158 barrels of flour in the corresponding week of last year. The exports last week are very much greater than before this year, fully three times the average.

For the week ending Aug. 5 receipts and shipments at Chicago and Milwaukee were:

	Receipts.		Shipments.	
	1882.	1881.	1882.	1881.
Chicago	2,701,972	3,450,056	2,729,556	3,046,664
Milwaukee	113,990	245,037	47,733	214,091
Both	2,824,962	3,695,093	2,777,289	3,860,755

The receipts were 31 per cent. and the shipments 39 per cent. less than last year; compared with the previous week of this year there was a *decrease* of 493,000 bushels (15 per cent.) in receipts, but an increase of nearly 10 per cent. in shipments.

For this week ending Aug. 5 receipts and shipments at Buffalo were:

	Receipts.		Shipments.	
	1882.	1881.	1882.	1881.
By rail	560,500	1,571,700	843,800	502,055
By water	1,597,000	827,700	1,182,500	1,416,410
Total	2,157,500	2,399,400	2,026,300	1,918,465

The rail receipts were about 38 per cent. of the whole this year, against 65⅛ per cent. last. The rail shipments were 41⅝ per cent. of the whole this year, and but 26 per cent. last.

For this week ending Aug. 5 receipts at four Eastern ports were:

Bushels:	New York.	Boston.	Phila.	Baltimore.	Total.
1882	2,162,725	393,706	579,550	1,618,066	4,754,047
1881	3,323,603	257,058	744,200	1,068,976	5,403,837
1880	3,842,874	571,124	810,900	1,998,126	7,223,024
P. c. of total:					
1882	45.5	8 3	12.2	34.0	100.0
1881	61 7	4.7	13.8	19.8	100.0
1880	53.2	7.9	11.2	27.7	100.0

Philadelphia and Baltimore together have 46 2 per cent of the whole this year, against 33.6 last year and 38.9 in 1880. This is the third week of very large receipts at Baltimore, which are the more striking because they come after six months of extraordinarily small receipts at that port. All but about 3 per cent. of its receipts were wheat, of which it received nearly as much as New York, but not one-tenth as much flour.

Of the New York receipts, 313,900 bushels (14½ per cent.) was by canal this year, against 1,241,600 (37 per cent.) last year.

Chicago and Milwaukee Receipts.

For the week ending Aug. 7, receipts were:

	1879.	1880.	1881.	1882.
Chicago:				
Grain, bush	3,444,115	3,652,157	3,385,060	2,307,103
Flour, bbls.	41,579	52,324	118,455	46,825
Hogs, No	55,906	92,558	105,760	62,998
Milwaukee:				
Grain, bush	153,480	130,250	238,317	90,045
Flour, bbls	37,721	45,582	75,331	57,050
Hogs, No	1,641	3,344	5,037	7,727

The grain receipts at Chicago were very much less than the week before, when they were very large, and were 30 per cent. less than in the corresponding week of last year. This is due wholly to the falling off in corn. The wheat receipts were 154 per cent. more than last year, and about 50 per cent. more than in 1879 and 1880, which were great wheat years; but the corn receipts were 64 per cent. less than last year.

Reducing flour to bushels, the receipts of flour and grain at the two places for the week were:

	1879.	1880.	1881.	1882.
Bushels	3,945,445	4,222,084	4,495,414	2,864,585

This year the receipts are 36 per cent. less than last year, 32 per cent. less than in 1880, and 27½ per cent. less than in 1879.

Coal Movement.

Anthracite tonnages for the seven months ending July 29 are reported as follows, the tonnage in each case being only that originating on the line to which it is credited:

	1882.	1881.	Inc. or Dec.	P. c.
Phila. & Reading	3,574,644	3,468,836	I. 105,808	3.0
Northern Cent., Shamokin Div., and Summit Br. R.R	644,845	545,929	I. 98,916	18.1
Sunbury, Hazleton & Wilkesbarre	29,920	4,407	I. 25,513	579.9
Pennsylvania Canal	230,718	199,880	I. 30,838	15.4
Central of N. J., Lehigh Div	2,521,927	2,357,728	I. 164,199	7.0
Lehigh Valley	3,184,643	2,913,860	I. 270,783	9.3
Pennsylvania & N. Y.	111,010	46,785	I. 64,225	137.2
Del., Lacka. & West	2,413,310	2,204,480	I. 208,830	9.5
Del. & Hudson Canal Co	1,854,236	1,860,747	D. 6,509	0.3
Pennsylvania Coal Co.	720,666	679,519	I. 41,147	5.9
State Line & Sullivan.	31,985	34,268	D. 2,283	6.7
Total anthracite	15,317,906	14,316,439	I. 1,001,467	7.0

The tonnage of anthracite for the corresponding period for six years has been:

1882	15,317,906	1879	13,898,662
1881	14,316,439	1878	8,498,437
1880	11,509,280	1877	11,509,280

The anthracite companies made a small advance in prices on August 1, but it seems to have been merely nominal, and it is said that sales are made for the fall trade at prices below the list. The stocks of coal are increasing, and large dealers profess to have no fear of any considerable increase in prices, although the trade is fairly active for the season.

Semi-bituminous tonnages reported for the seven months are as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Cumberland, all lines	567,343	1,138,612	D. 571,269	50.1
Huntingdon & Broad Top.	156,553	124,605	I. 31,948	25.6
East Broad Top	52,613	42,941	I. 9,672	22.5
Tyrone & Clearfield	1,594,141	1,376,522	I. 217,619	15.8
Bellefonte & Snow Shoe.	125,145	58,693	I. 66,452	112.5
Total semi-bituminous	2,495,795	2,741,373	D. 245,578	9.0

The Clearfield strike is practically at an end, and the only question at issue is whether the operators shall keep the new men they have brought in. The Cumberland strike continues, but there are indications that it will soon be over.

Notwithstanding the stoppage of Cumberland shipments, the market for semi-bituminous coals appears to be well supplied, and prices are not high. Several large contracts are reported at moderate prices, including one for 40,000 tons of Clearfield for the Boston & Maine road at somewhat less than $5.50 per ton in Boston.

The actual tonnage passing over the Pennsylvania & New York road for the eight months of its fiscal year from Dec. 1 to July 29 was as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Anthracite	687,296	648,687	I. 38,609	5.9
Bituminous	251,257	278,999	D. 27,742	9.9
Total	938,553	927,686	I. 10,867	1.5

The larger part of the anthracite comes from the Lehigh Valley road. Most of this coal is carried through to Waverly for shipment to Buffalo and points West.

Actual tonnage passing over the Huntingdon & Broad Top road for the seven months was as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Broad Top coal	156,553	124,605	I. 31,948	25.6
Cumberland coal	85,331	163,706	D. 78,375	47.9
Total	241,884	288,311	D. 46,427	16.1

The decrease in tonnage was entirely the result of the Cumberland strike, Broad Top showing a large increase.

Shipments of Cumberland coal away from the region for the seven months were as follows:

	1882.	1881.	Decrease.	P. c.
Balt & Ohio R.R.	469,835	758,729	288,894	38.1
Bedford Div., Pa. R.R.	74,842	98,534	23,692	23.9
Ches. & Ohio Canal	18,834	233,247	214,413	92.0
Total	563,511	1,090,510	526,999	48.3

Of the shipments from the mines this year 48,275 tons passed over the George's Creek & Cumberland road, against 48,115 tons at the same time last year.

Bituminous tonages reported for the seven months are as follows:

	1882.	1881.	In. or Dec.	P. c.
Barclay R.R. & Coal Co.	251,257	241,704	I. 9,253	3.9
Allegheny Region, Pa. R.R.	299,839	156,129	I. 143,710	92.1
Penn and Westmoreland	754,135	496,126	I. 258,009	52.0
West Penna. R.R	201,557	177,049	I. 24,508	13.8
Southwest Penn. R.R	48,655	16,503	I. 32,152	194.8
Pittsburgh Region, Pa. R.R.	400,893	350,131	I. 50,762	14.5
Total bituminous	1,956,336	1,437,642	I. 518,694	36.1

Although showing a large increase everywhere for the year, the bituminous trade in Western Pennsylvania has shown a reduction for two or three weeks past, which is probably due to the iron strike.

The coal tonnage of the New York canals from the opening to the end of July was as follows:

	1882.	1881.	In. or Dec.	P. c.
Anthracite	497,359	374,741	I. 122,618	31.9
Bituminous	75,990	93,945	D. 17,955	14.8
Total	573,349	468,686	I. 164,663	12.4

The canals opened for navigation April 11 this year and May 17 last year.

Coke tonnages reported for the seven months were as follows:

	1882.	1881.	Inc. or Dec.	P. c.
Snow Shoe	13,562	5,222	I. 8,340	160.4
Allegheny Region, Pa. R.R.	64,043	57,906	I. 6,137	10.6
Penn and Westmoreland	148,748	110,004	I. 38,744	35.2
West Penna. R. R.	69,564	68,742	I. 822	1.2
Southwest Penna. R. R.	1,030,801	817,572	I. 213,229	26.1
Pittsburgh Region, Pa. R R	362,361	356,458	I. 5,903	1.4
Total coke	1,689,079	1,415,904	I. 273,175	19.3

These tonnages are all over the Pennsylvania Railroad. No reports are made of the river coke trade from Pittsburgh.

The coal tonnage of the Pennsylvania Railroad for the seven months was as follows:

	1882.	1881.	Increase.	P. c.
Anthracite	941,801	759,192	184,609	24.4
Semi-bituminous	1,967,745	1,699,719	267,026	15.8
Bituminous	1,705,047	1,206,041	499,006	41.4
Coke	1,689,079	1,415,904	273,175	19.3
Total	6,303,672	5,078,856	1,224,816	24.1

The tonnage for January was 810,571 tons; February, 823,788; March, 1,114,894; April, 844,630; May, 1,067,845; June, 859,433; July, 782,511; total, 6,303,372 tons.

The Tennessee Coal, Iron & Railroad Company, shipped in July 12,060 tons of coal, and 9,477 tons of coke. For the seven months to July 31, the shipments were 84,641 tons of coal and 62,310 tons of coke, a total of 146,951 tons.

Cumberland coal shipments for the week ending August 5, were 4,623 tons over the Cumberland & Pennsylvania road, 657 tons delivered directly to Baltimore & Ohio road, and 10,920 tons over the West Virginia Central & Pittsburgh road, a total of 16,200 tons.

Coal shipments from Pictou, Nova Scotia, for the six months ending June 30, were: 1882, 218,901; 1881, 141,223; increase, 77,678 tons, or 55.1 per cent.

Traffic of New York Canals.

For the week ending July 31 the Canal Auditor reports:

	1882.	1881.	Decrease.	P. c
Tons shipped	217,555	218,907	2,325	1.1
Miles cleared by boats	259,001	278,727	19,726	7.1
Tolls	$24,564	$24,846	$282	1.1

The leading articles shipped were, in tons:

	1882.	1881.	Inc. or Dec.	P. c.
Lumber	80,477	66,856	I. 13,621	20.4
Grain	22,752	38,847	D 16,095	41.4
Iron and iron ore	25,652	31,135	D. 5,483	17.6
Salt	4,954	6,299	D. 1,345	21.3
Stone, lime and clay	17,000	10,732	I. 6,268	58.6
Coal	51,696	43,346	I. 8,350	19.2
Sugar, molasses and coffee	339	571	D. 232	40.1
Domestic woolens and cottons	179	939	D. 760	80.9

The lumber shipments were extraordinarily large during the week this year, and in all but grain the traffic is fair.

East-Bound Rates to Montreal.

Mr. John Porteous, General Freight Agent of the Grand Trunk Railway of Canada, has issued the following notice to connecting lines:

"On and after Aug. 7 Chicago and East St. Louis eastbound rates for Montreal will be the same as to Philadelphia, on which Montreal advised percentage divisions will apply.

"Philadelphia rates from Chicago and Montreal, advised percentage divisions, will apply to other points authorized to quote Chicago rates on Montreal freight.

"Chicago rates to Philadelphia, with Louisville bridge tolls added, will apply on Montreal freight from Louisville.

"This notice does not cancel the advised commissions on cotton consigned to Montreal unless it is shipped under ocean bills of lading.

"Any engagement at Baltimore rates will be carried out, provided this office is promptly advised, and such as has been made previous to the receipt of this notice; but such freight must be in transit previous to the 14th of August.

"Toledo and Detroit rates to Philadelphia will apply on freight consigned to Montreal from these places, and from Grand Trunk Railway junction stations west of Sarnia, authorized to quote Detroit east-bound rates.

"These rates include Montreal charges on freight under ocean bills of lading (grain excepted), and must be deducted from the inland proportion before prorating and added to the Grand Trunk road proportion.

"The same seaboard elevator charges will be made on grain shipped via Montreal, for export, as advised by Commissioner Fink July 24."

THE SCRAP HEAP.

Car Notes.

The Chicago, Burlington & Quincy shops in Aurora, Ill., are building three chair cars for the road. They are 58 ft. long, 10 ft. 4 in. wide over the sills and have wrought-iron body-bolsters. They are furnished with two saloons, two toilet rooms and have 40 reclining chairs, placed in four rows, two on each side of the aisle. They have Miller platforms and couplers and the Westinghouse automatic brake.

The Southern States Coal, Iron & Land Co. in its shops at South Pittsburgh, Tenn., is building a number of gondola cars for the Cincinnati, Selma & Mobile road.

The Alabama Great Southern shops in Chattanooga, Tenn., are building a number of flat cars for the road.

The Detroit Car Spring Co., which began its operations three years ago in a frame building of moderate dimensions, has kept on extending, enlarging and improving its facilities until in now occupies a complete brick structure 190 by 240 ft., devoted entirely to the manufacture of railway car springs. Other improvements still are contemplated.—*National Car-Builder.*

The Jackson & Sharp Co. in Wilmington, Del., are building four passenger cars for the Washington & Western road. They are fitted with the Westinghouse antomatic brake, and have Janney couplers.

The Middletown Car Works at Middletown, Pa., are building a number of stock cars for the Shenandoah Valley road.

The Missouri Car & Foundry Co. in St. Louis has lately completed 100 coal cars for W. P. Rend & Co., of Chicago.

The Globe Iron & Columbia Car Spring Works, of Andrews & Clooney, at No. 545 West Thirty-third street, New York, are running to their full capacity on car-springs of all kinds, engine springs, car wheels and car castings, brass bearings and similar work. The works are to be enlarged by a new building which will double the foundry capacity. They are shipping car wheels and axles for street railroads to all parts of the world, and have just finished a large order for passenger and engine elliptic springs. In the machine shop they are busy on engines and general machinery for heating the city by steam.

Bridge Notes.

H. S. Hopkins & Co. in St. Louis have lately completed four bridges for the Toledo, Cincinnati & St. Louis road in Illinois, the spans being 183 ft., 106 ft., 106 ft. and 80 ft. They have also finished a wrought-iron draw-span over Saline River in Arkansas for the Little Rock, Mississippi River & Texas road, and two Howe-truss bridges over the same stream for the Texas & St. Louis.

The Dominion Bridge Co. has been organized in Montreal, and will build bridge works in or near that city. The incorporators are Job Abbott, Phelps Johnson, Luke Lyman, Henry Macfarland and Angus Thoms.

The Wrought-Iron Bridge Co. at Canton, O., has taken the contract for a bridge over the White River at Marsh Ferry, Ind. It will be 330 ft. long, in two spans.

Iron and Manufacturing Notes.

Messrs. Greenwood & Hutchinson, of Columbus, O., announce that they have made arrangements with the L. B. Flanders Machine Works (Pedrick & Ayer, Proprietors), of No. 1,025 Hamilton street, Philadelphia, for the manufacture and sale of the Greenwood Universal planer chuck. All orders and communications relating to the Greenwood chuck should be addressed accordingly.

The old and well-known firm of Benjamin Pike's Sons & Co., of No. 928 Broadway, New York, manufacturers of engineering and optical instruments and draftsmen's tools, has been dissolved by the retirement of Mr. Joseph Robinson. The remaining partners, Daniel and Arnold M. Pike, continue the business at the same place and under the same firm name.

The South Tredegar Iron Works in Chattanooga, Tenn., are very busy on orders for track-bolts and other rail fastenings.

Carter Furnace, in Carter County, Tenn., is running on car-wheel iron for the Knoxville Car Wheel Co. A second stack for this furnace is nearly completed and will go into blast as soon as it is ready.

The Lehigh Rolling Mill Co. has been organized with a capital stock of $1,000,000 by the purchasers of the Allentown Rolling Mill. The mills are at Allentown, Pa., and the

principal office in Philadelphia. The corporators are Henry Cochran, Franklin A. Comly and John R. Fell, of Philadelphia, Ario Pardee and Ario Pardee, Jr., of Hazleton, Pa.

The Roane Iron Co. in Chattanooga, Tenn., has started up its mill after a week's stop.

Lookout Rolling Mill is running single turn on orders Business looking up and prices firmer with better demand. Are adding to their machinery a new punch for light rails and fish plate, punches four holes at once and has a rail-straightening attachment; new 40-horse power engine, and two new saws for sawing ends of bars and rails; also rolls for making angle fish plate.—*Chattanooga (Tenn.) Tradesman.*

The Helmbacher Forge and Rolling Mill in St. Louis are full of work on orders.

The Rail Market.

Steel Rails.—The market is quiet, with a number of sales of small lots, chiefly for early delivery. Quotations continue $49 to $50 per ton at mill for immediate delivery, and about $47 for winter orders.

Iron Rails.—Quotations are still $45 to $48 per ton at mill, according to section. Very little new business is reported, and sales have been chiefly of small lots of light rails.

Rail Fastenings.—Spikes are in active demand at $3.10 to $3.15 per 100 lbs. Fish-plates are unchanged at $2.50 to $2.70; track-bolts, $3.75 to $4.25.

Old Rails.—There has been some inquiry but few sales reported. Quotations are $26 to $27 per ton in Philadelphia for tees, and $28 to $28.50 for double-heads. The market is not very well supplied just at present.

A Runaway Train.

The terrible accident on the Cranberry coal road at the Buffalo, Pittsburgh & Western junction on Friday was remarkable in many respects. The train, when made up ready to run down into the city, consisted of 17 flat cars, all coal laden. Engineer George Wright had charge of the engine, David Morgan was conductor and B. McLain fireman. Two lads named Aiken and Latshaw were stationed in the middle of the train, and a number of men and boys were on the last car. All the brakes were set tightly when the train drew away from the pit. A quarter of a mile distant it entered upon the steep grade, and here all control of the train was lost. From that moment until the hind car jumped the track, two miles above the city, and was smashed into kindling wood, the speed gradually increased, and at that time it had attained a frightful velocity. How terrible must have been the force of the cars is plain to be seen. The trees and earth are torn up, and the cars, coal and all, seem to have made a clean jump of 30 or 40 feet and alighted among the trees. It was here that the greatest loss of life occurred. Two were killed outright, one died shortly afterward on the spot, while some ten or a dozen others were bruised and mangled in a terrible manner, and a number of them have since died. On down, for almost a mile, the rushing train kept the track, though in many places where there are slight curves, the ties are moved several inches from their former position, indicating how terrible must have been the strain upon the steel rails. At this point, where another short curve occurs, just outside the city limits, the force of the train bent the rails, and made them curve just the reverse of what it was. Ten rods below the spot a switch was reached, and the engine and all the cars, except the last two, passed safely over. These latter left the track a rod or so above the switch, and tore up the ties and broke the rails like pipe stems. From this down to the switch the rails are warped, and in some places large pieces are cut out of them, as if done with a sharp knife, and the ties are bruised and splintered. At the point where the remaining cars left the track the wreck was piled high in a confused mass, the track and ties being torn up and all semblance of a railroad destroyed. Seven persons were killed outright and a dozen or more injured. It is calculated that the train attained a speed of 75 to 80 miles an hour, and the terror-stricken men aboard were compelled to lay flat upon the coal in order to keep from being blown off only to be dashed to pieces at the foot of the steep descent.—*Titusville (Pa.) Herald, Aug. 6.*

A Prospecting Party.

The Wisconsin Central management has just dispatched Mr. C. D. Lunt north, in charge of a company of thirteen prospectors to investigate and report concerning the amount of standing pine on the Wisconsin Central road. During the past season new mills have been established at Phillips, Butternut and other points on the line of that road, and it is the desire of the company to ascertain the amount of pine upon the lands to more carefully gauge these to the number and capacity of existing and prospective mills. Thus far the party has traversed only the small section of country lying about Jacob and Butternut stations along the east fork of the Chippewa and the North Fork of the Flambeau rivers. Altogether about 39,000 acres have been looked over. The prospectors, besides taking into account the standing pine on the Central's lands, also investigate the general characteristics of the soil. In his first report, Mr. Lunt states that the water within the 39,000 acres looked over is clear and supplied by numerous springs. The swamps are few, the land rolling, and the supply of hard maple, basswood, rock elm and birch large.

A Cool Request.

As the Geneva train was going up on the west side the other day, heavily loaded with freight cars and the usual passenger coach attached, a lady with the historical bandbox made her appearance at the Galena street crossing where the trains are instructed to stop for passengers. Owing to the heavy load the train could not be stopped on the crossing but ran a few rods beyond, and backed up to take on the passenger. On arriving at the crossing conductor Fred Robinson stepped out on the platform to assist her aboard, when she sweetly inquired: "Are you the conductor of this train?" "Yes, ma'am," politely responded Fred. "Well," said she, "here's a box of asparagus which I wish you would leave at the Batavia station." There was a tableau in which the trainmen were the sole actors, as the fair lady leisurely wended her way down Galena street, and the train slowly pulled out with its heavy load.—*Aurora (Ill.) Herald.*

OLD AND NEW ROADS.

Ashland, Montreal River & Ontonagon.—This company has been organized to build a railroad from Ashland, Wis., east to the Montreal River, the Michigan line, about 40 miles. It is to be part of the line from Duluth to Mackinac.

Atlantic & French Broad.—An agreement has been made for a consolidation with the Cumberland Railway, of Kentucky, the Morristown, Cumberland Gap & Ohio, of Tennessee, and the Morristown & Carolina companies. None of these companies has any completed road; their projected lines extend from Columbia, S. C., to Cumberland Gap in Tennessee,

Bedford, Springville, Owensboro & Bloomfield.—A decree has been entered in the United States Circuit Court in the suit of the Indianapolis Rolling Mill Company, directing the sale of the stock and bonds of this company held by the contractors' assignee, in order to satisfy the claim of complainants, which is for iron furnished for the road, and amounts to about $160,000.

Bradford & Oil City Air Line.—This company has been organized by the consolidation of the Bradford & Garfield, the Bradford & Tiona, the Garfield & Cherry Grove and the Garfield & Tionesta companies, all recently chartered in Pennsylvania. The proposed line is from Bradford, Pa., southwest to Oil City, about 70 miles.

Buffalo, Cayuga Valley & Pine Creek.—The Buffalo *Express* says: "This company, through its Chief Engineer, Col. Jas. O. McClure, on Monday filed in the County Clerk's office a map of that portion of its road lying within Erie County. The line of the Erie road is used from this city to a point just east of the station at Lancaster. From that point the road runs in a southeasterly course, crosses the land of L. G. Blackman and the Indian Reservation, and thence to Little Buffalo Creek, through property of N. Peckham, E. Denny, and F. X. Mason; and beyond, crossing lands of F. H. Naver and J. Stephen, to the Rawson road. It runs diagonally through Elma, cutting across Clinton Street. Just north of Marilla village it makes a sharp curve to the east, runs through estates of N. Larbin, A. J. Adams, J. Stedman, and the Patterson estate, and others, and passes from the county along the south side of Cayuga Creek. The grades in this county are all easy, the gradient at most points being less than 30 feet to the mile. The steepest climb is just north of Marilla, where the grade is for a short distance 82.25 ft. At the Little Buffalo Creek crossing, the grade is 79.21 ft. to the mile. The line is 21 miles long from Lancaster station to the Wyoming County line. Right of way is now being obtained, and the directors intend pushing the road to completion as soon as possible. If built according to this alignment, there will remain but four towns in the county without a railroad—Colden, East Hamburg, Boston and Grand Island."

Buffalo, Pittsburgh & Western.—On the extension to Buffalo the track is now laid to Silver Creek, nine miles northeast from the late terminus at Dunkirk. Between Silver Creek and Buffalo work is progressing steadily. The track is being laid in the city of Buffalo, and the crossings put in. The contractors expect to have trains running to Buffalo this month.

Cannon Valley.—This company has now finished the grading of about 12 miles between Northfield, Minn., and Cannon Falls, and is at work between Northfield and Faribault. The line is parallel and close to the branch of the Chicago, Milwaukee & St. Paul.

Central Vermont.—The formal opinion of the Vermont Supreme Court in the Langdon case has been filed. The mandate of the Court in the case, which has already been published, contains the decision of the Court, which is that the so-called trust debt takes precedence of the claims of the Vermont & Canada Company and the Vermont Central bondholders, and that those claimants can retain their property only by paying the trust debts as determined or to be determined by the Court of Chancery.

Chesapeake & Ohio.—Work is progressing on the extension from Newport News, Va., to Old Point Comfort. The grading is nearly done, and track has been laid for six miles from Newport News.

Chicago & Alton.—It is announced that this company will soon increase its capital stock 10 per cent. by a new issue. The proceeds of the new stock will be used to pay off the first-mortgage bonds maturing Dec. 1 next.

Chicago, Milwaukee & St. Paul.—Notice is given that, in pursuance of the authorization of the stockholders at the last annual meeting, the board of directors have passed a resolution giving to the common and preferred shareholders the right to take an amount of the common stock equal to 20 per cent. of the amount of stock held by them respectively on the closing of the books on the 15th day of September next, payable 50 per cent. in cash at the time of the delivery of the stock, and the other 50 per cent. charged against the undivided net earnings of the company. Said stock to be delivered and paid for in three equal amounts on Oct. 20, Nov. 20 and Dec. 20 next.

It is stated that work will soon be begun on the extension of the Hastings & Dakota Division from Wilmot, Dak., westward into Ransom County.

On the branch from Northfield, Minn., through the Cannon River Valley, track is laid to Waterford, three miles, and work is progressing eastward towards Cannon Falls. This branch is parallel and close to the Cannon Valley road.

Chicago & Northwestern.—The Pullman sleeping cars were withdrawn from this road Aug. 1, and their place taken by the cars of the Wagner Company. The last-named company purchases and will continue to use 26 cars which were owned jointly by the Northwestern and the Pullman companies.

The sleeping car service on the St. Paul & Minneapolis Line of the Northwestern will be conducted jointly by the Pullman and Wagner people. One half of the trains will have Pullman and the other half Wagner sleepers. This arrangement became necessary because the Northwestern does not extend to St. Paul, but runs its St. Paul trains over the Chicago, St. Paul, Minneapolis & Omaha, from Elroy to St. Paul.

Cincinnati & Eastern.—The track is now laid and trains are running to Shimar on the eastern line of Adams County, O., which is 12 miles eastward from the late terminus at Newport and 79 miles from Cincinnati. Grading is in progress from Shimar to Otway in Scioto County.

Columbus, Chicago & Indiana Central.—It is announced that holders of more than the amount necessary to secure the adoption of the plan of reorganization, have signed the agreement. It is still held open until further notice, in order that the remaining bondholders may join in the agreement if they so desire.

The capital stock of this company consists of $13,960,823 03 common and $10,000,000 authorized preferred stock, intended to be issued for junior bonds. The road was leased in 1869 to the Pittsburgh, Cincinnati & St. Louis, the rental including maintenance of road and equipment, 30 per cent. of the gross earnings, and, in any event, the interest on $15,000,000 of the Columbus, Chicago & Indiana Central's first-mortgage bonds and $821,000 of its second-mortgage, any remaining net earnings to be paid out as interest on the junior mortgage bonds to the extent of $10,000,000, or as dividends on the preferred stock, into which the juniors may be converted. After this a sinking fund was provided for on the $15,821,000 first and second mortgage bonds, and if anything should ever be left after that, the common stock would get it. In consequence of litigation the United States Court ordered the amount on which interest was to be paid to be reduced to $15,584,000, and fixed the rental due up to January, 1880, as about $2,400,000. The lessees appealed to the United States Supreme Court, in which the case is still pending, but the adoption of this plan will probably result in its discontinuance. The scheme involves the foreclosure of the consolidated mortgage and the formation of a new company with $20,000,000 6 per cent. preferred stock and $10,000,000 common stock; and $22,000,000 new first-mortgage 5 per cent. bonds, of which $5,500,000 are to be reserved for the discharge of underlying divisional bonds as they mature, $12,878,000 for the company's general obligations, and the remaining $3,622,000 to be used in improving the property. The Pittsburgh, Cincinnati & St. Louis is to pay the new company $2,400,000, and the old bondholders are to receive, besides a new bond equal to the old, $150 in cash and $400 in preferred stock on each $1,000 bond deposited, while the income bondholders are to pay 10 per cent. of the par value of their bonds, and to receive for each $1,000 bond $1,250 in preferred and $250 in common stock, and old stockholders are to pay an assessment of 5 per cent., and receive new stock equal to one-half their holdings. To be carried out, the plan required the assent of two-thirds of the amount of bonds voted in favor of the agreement of November, 1875.

In order to secure the reorganization and to put a stop to litigation, the Pennsylvania Railroad Company some months ago bought, through Mr. Wm. L. Scott, $8,738,000 of the consolidated bonds. The reorganization will put the Pennsylvania interest in complete control, as its holding of second-mortgage bonds (to be converted into income bonds) will bring it over 128,000 shares of preferred and 51 265 of common stock, or more than half of each class. The Columbus, Chicago & Indiana Central having been, however, long operated by the Pittsburgh, Cincinnati & St. Louis, the value of the reorganization to the Pennsylvania consists more in the removal of all possibility of loss of this portion of its system than in any actual acquisition. The termination of a long and troublesome litigation was also an object to be secured.

Decatur & Southern Nebraska.—This company has filed articles of incorporation in Nebraska. The incorporators are A. B. Fuller, George P. Thomas, J. P. Lotta, W. E. Driery, D. C. Griffin, J. C. Loughlin, James Ashley and L. R. Hopwell, all of Burt County. The northern terminus of the proposed road is to be on the west bank of the Missouri River at or near Decatur, Burt County, Neb., running thence in a southwest direction to a point on the southern boundary of the state east of the ninety-seventh degree of longitude west, and thence to Topeka, Kan.

Denver, Longmont & Northwestern.—The Denver, Utah & Pacific Company has began suit against this company and asks for the appointment of a receiver. The complaint alleges that the company is indebted to the Utah Company in a large sum for rent of tracks, and that the bonded debt is about five times the cost or present value of the road.

Denver & Rio Grande.—Track on the Utah Extension is now laid from Gunnison, Col., westward 35 miles, and work is progressing rapidly. There are 136 miles to be laid to reach the Utah line.

Detroit, Mackinac & Marquette.—This company has sold to the American Lumber Company, of Toronto, the standing pine on 500,000 acres of its land grant, including all the lands except those in Marquette County and the eastern end of Chippewa County. The price to be paid is not stated.

Emporia, Rich Hill & St. Louis.—This company is making surveys of its proposed line from Emporia, Kan., to the Missouri line, and will soon begin the survey in Missouri.

Erie & Genesee Valley.—Arguments were heard this week on a suit brought in the New York Supreme Court at Rochester, to foreclose a mortgage for $120,000 on this road, made in 1860; no interest has been paid since 1875. The arguments heard were on a motion to bring in the New York, Lake Erie & Western Company and L. C. Woodruff as defendants in the suit. The road extends from Mt. Morris, N. Y., to Dansville, 12¼ miles, and trains are run over it by the Erie.

European & North American.—A dispatch to the Boston *Advertiser* from Augusta, Me., Aug. 8, says: "The consolidation of the European & North American Railroad with the Maine Central system is soon to be an accomplished fact. Last Saturday, President Phillips of the Eastern, President Jackson of the Central, and President Woods of the European, made an inspection of the latter's road with Superintendent Tucker of the Central. The result was their satisfaction with the condition of the road-bed and rolling stock, while the favorable report of their bridge builder on the bridges is but a matter of a few days. The Auditor of the Eastern road has been examining the books of the European road, and declares their condition to be as stated by its officials. With these preliminaries adjusted the directories of both roads will sign the preliminary lease within a fortnight, which will be ratified within a month by their respective stockholders, unless something altogether unforeseen shall intervene. The conditions of this lease, as already practically decided upon, are these: The Maine Central road takes the European & North American as it stands, in perpetuity, including all its property, assuming whatever floating debts there may be and the entire accounts since April 1, 1882. It agrees to pay the annual interest of $60,000 due the city of Bangor for $1,000,000 advanced to build the road, and in 1894 provide for the maturity of this debt, now a first mortgage on the road from Bangor to Winn, 51 miles; and, further, to pay annually 5 per cent. on the stock of $2,500,000. Provided the road is not maintained in its present condition, and these obligations are not paid, it reverts to its stockholders. Some arrangements whereby these roads might be united has been sought by the Maine Central, and this plan secures it. * *

"During the five years past the road has largely increased its business, its receipts of $336,000 in 1879 rising to $477,937 in 1881, and estimated at $550,000 for the current year. During this time the Bangor interest has been regularly paid, and the rest of the earnings put into the road or used to pay off some floating debt. The effect of this policy is that where in 1877 was a broken-down road, with everything going to decay, are now 114 miles of excellent track, 55 of steel rail, of which 2,500 tons were laid last year. The bridges have nearly all been rebuilt, stations and wharves thoroughly overhauled and the track ballasted. The rolling stock includes 15 engines, 28 coaches, baggage and postal cars, 420 freight cars, a large part new the past year. The operating expenses in 1881 were $398,168, leaving a net income of $79,168. But of these expenses, over $99,000 were for new rails alone.

"It will be seen from the foregoing that the move on the part of the Maine Central is one of great importance. When completed, it will give that corporation the only through line across the state, a double route from Portland to Augusta, and thence a single line to Vanceboro, making, with branch roads, a system of 464 miles out of 1.181 in the state. With its connections, it forms the only route between the states and the maritime provinces, and already there is in view faster trains and better service between Boston and Halifax, which will lessen the time to Liverpool more than one day. The New Brunswick road, of which Samuel Thorne, of New York, is President, has recently leased the New Brunswick & Canada. The former stretches from

Frederickton far up into the Aroostook at Presque Isle, and the latter runs from Woodstock, N. B., where it connects with the former, southward, just the other side of the border to St. Stephen's, connecting at Vanceboro with the European road. The new arrangement will tend to develop very friendly relations between the Maine and New Brunswick systems."

Georgia.—This company has appealed to the Supreme Court from the judgment of the Circuit Court refusing an injunction to restrain the Georgia Railroad Commission from regulating rates over its road.

Grand Trunk.—This company's Georgian Bay & Lake Erie road was formally opened for traffic to the new terminus at Wiarton, Ont., on Georgian Bay, on Aug. 1. Wiarton is 106 miles northward from the main line of the Grand Trunk at Stratford, and 168 miles from the southern terminus of the division at Port Dover, on Lake Erie.

Gulf, Colorado & Santa Fe.—On account of the unfriendly action of the Houston & Texas Central, this company will be obliged to build about two miles of road, to bring its Dallas Branch into the city of Dallas. Heretofore the Houston & Texas Central track has been used.

A considerable force is now at work putting the line from Cleburne to Dallas into good order. This line was very poorly built in the first place.

Hannibal & St. Joseph.—A dispatch from Jefferson City, Mo., Aug. 8, says: "Judge McCrary, of the United States Circuit Court, has rendered and filed here a long opinion in the Hannibal & St. Joseph Railroad bond case. He decides that the company must pay to the state of Missouri a further sum of money, and that the sum must be ascertained as the result of a full compliance with the act of March 26, 1881, for the investment of the money, which, he holds, the state officers were bound to comply with. The taking of an account is referred to J. K. Craven, of Kansas City, Mo."

Illinois Central.—This company's statement for August shows the traffic on its lines operated as follows:

	1882.	1881.	Inc. or Dec.	P. c.
In Illinois	$618,478	$543,338	I. $70,160	12.8
In Iowa	133,773	171,686	D. 37,913	22.0
Total	$752,251	$720,004	I. $32,247	4.5

During July, 1882, the land sales were 560.58 acres for $3,400.65, and the cash collected on land contracts was $4,203.57.

Lehigh & Hudson River.—On this road, the completion of which we recently noted, a new time-table will take effect Aug. 14, when through trains will begin to run between Belvidere, N. J., and Greycourt, N. Y., 63 miles, and the line will be opened for through business. At Greycourt connection is made with the Erie, and at Belvidere with the Pennsylvania system.

Little Rock, Mississippi River & Texas.—The Ouachita Division is now completed and opened for traffic to Warren in Bradley County, Ark., 17 miles westward from the late terminus at Monticello, 51 miles from the junction with the Little Rock Division at Trippe, and 58 miles from Arkansas City. Work is progressing from Warren westward.

Loma Prieta.—This company has been organized to build an extension of the Santa Cruz Railroad from Aptos, Cal., to White's Lagoon, about five miles.

Maine Central.—It seems to be certain that this company will lease the European & North American, and will enter into an alliance with the New Brunswick Company. This will probably stop, for a time at least, the building of the proposed line from Bangor to the Aroostook, as the New Brunswick connection will give nearly all the advantages which could be secured by the extension.

Manhattan Elevated.—The New York *World* publishes the following statement from this company for the month of July:

	Metropolitan.	N. Y. Elevated	Total.
Earnings	$194,726	$270,891	$465,617
Expenses	138,594	160,929	299,523
Net earnings	$56,132	$109,962	$166,094
Fixed charges	65,629	50,965	116,594
Surplus	.....	$58,997	$49,500
Deficit	$9,497	.....	.....

"From this must again be deducted the proportion of personal and structural taxes passed under the existing system on the Metropolitan Company, amounting to $16,641, from which it appears that the total deficit of the Metropolitan toward meeting the interest on its bonds and its taxation without touching the stock amounts to more than $25,000 for the month of July, which is at the rate of $300,000 per annum."

Marietta & Cincinnati.—The sale of the "pool stock" of the Cincinnati & Baltimore was completed in Cincinnati last week, when 11,772 shares were delivered and paid for at $55 per share, the par value being $50. This stock, it will be remembered, is bought in the Baltimore & Ohio interest, in order to quiet the opposition of the Cincinnati & Baltimore stockholders to the plan of reorganization.

Holders of over two-thirds of all classes of Marietta & Cincinnati securities have signed the plan of reorganization, thereby making the agreement binding. A certificate to that effect has been filed with the Court by the Reorganization Committee.

A special term of Court will be held at Chillicothe, O., Aug. 22. It is expected that the various questions involved will then come before the Court, and that a final decree will be made in the foreclosure suit.

Mexican National.—The track of this road is now laid to the Salinas River, 239 kilometers from the Rio Grand at Nueva Laredo. The bridge over the Salinas River will delay the track-layers until about Aug. 15. The grading is completed to Monterey, over 30 kilometers farther, and track will be laid next month.

It is expected that Monterey will come into notice as a winter resort, when accessible by railroad. The winter climate is similar to that of Florida, without the low malarial lands.

New Brunswick & Canada.—This road has passed into the hands of the syndicate owning the New Brunswick Railway by a lease for 99 years, with the option of purchase at a fixed price. The Maine Central is reported to have an interest in the lease.

The road runs from St. Stephen, N. B., to Woodstock, 86 miles, with branches from Watt Junction to St. Andrews, 28 miles; McAdam Junction to Vanceboro, 7 miles, and Debec Junction, N. B., to Houlton, Me., 8 miles, making 129 miles in all. It completes to some extent with the New Brunswick road.

New York Freight Handlers' Strike.—The strike in New York is practically at an end, and will probably be formally abandoned by the freight handlers' organization in a day or two. Already many of the old men have applied for work, and a number of them have been taken back by the companies, while others will probably follow.

In Jersey City the men have resolved to hold out a little longer, but they have now no chance of success, and it is said that they are gradually falling off and going back to work, like the New York men, and an organized strike will hardly be kept up much longer.

New York, Lake Erie & Western.—The new loop line at Portage is completed and trains have begun to use it. The maximum grade on the new line in 26 ft. to the mile; on the old line the grade is 45 ft.

The company has begun to build new stock yards at Weehawken, N. J., on the Hudson River, near the oil docks. The new yards will cover about 15 acres, will be well paved and drained, and supplied with the necessary offices and other buildings. It is said that the Delaware, Lackawanna & Western, and the New York, Ontario and Western will make connection with these yards.

New York & New England.—Under the terms of the act of the Legislature of Massachusetts authorizing the sale of its 34,750 shares of New York & New England stock to the corporation, stockholders of record Aug. 1 had the privilege of subscribing pro rata to their ownership for the state stock thus transferred at cost. The terms of the sale by the state were that payment should be made in secured bonds at the rate of $50 per share of stock. The bonds are of $1,000 each or a multiple thereof, bearing interest at 6 per cent. per annum, and running for 20 years from Aug. 1, 1882. The total of these bonds issuable to the state is thus $1,737,500. The act authorizes the corporation to issue $3,262,500 bonds, in addition making a total of $5,000,000 second mortgage bonds. The first mortgage bonds of the company amount to about $10,000,000.

Boston, Hartford & Erie Berdell bonds have been convertible into New York & New England stock, and had to be so converted before the close of Tuesday, Aug. 1, in order to participate in the right to take new stock. The *Transcript* of Aug. 2 says: "Great activity existed yesterday at the office of the Treasurer of the road, and large piles of the bonds were brought in for conversion. So rapidly did business accumulate that not till late in the afternoon could it be told just how matters stood. Then it appeared that of the 20,000 Berdell bonds in all, 16,268 had been converted into stock, leaving 3,732 yet to be heard from. Many of those presented were nearly worn out with age and much handling, and it is likely that a portion of those outstanding are no longer in existence. To-day a circular will be issued by the company, informing each stockholder that the number of shares of the road is 127,530, which is the 162,680 minus the 34,750 just bought from the state, which is to be subscribed for, and also stating the number of shares for which he is entitled to subscribe. The ownership of four shares is necessary to entitle the holder to subscribe to one share of the state stock, and consequently the right inherent in each share will be worth one-fourth of the premium of the stock above $50. If the stock were worth $58, as it was quoted not long since, a right would be worth $2; if it were worth $54, as it sold yesterday, a right would be worth $1."

New York, Ontario & Western.—The circular issued to stockholders, under date of July 29, says: "In carrying out the plans adopted by this company for securing an outlet from its present southern terminus at Middletown to the Hudson River at Weehawken, opposite New York, this company receives $10,000,000 of the 5 per cent, 50-year, first-mortgage gold bonds of the New York, West Shore & Buffalo Railway Company, interest payable January and July. These bonds are part of an authorized issue of not exceeding $50,000,000, secured by a first lien on the railway extending from Weehawken to Buffalo, 425 miles, and upon 38 miles of branches, and all the franchises and property of the last-named company (including the equipment of the road). The construction of this road has been vigorously prosecuted for the past 18 months. It will be first-class; 425 miles, the main line, will be double-tracked and laid with 67-lbs. steel rails. It has two branches, one of 13 and the other of 25 miles. It will have a large and superior equipment. A force of more than 16,000 men is now employed on the work.

"To complete its contracts for constructing the line between Middletown and Weehawken, *via* Cornwall-on-the-Hudson, to make final payments for permanent improvements on its present line and for increased terminal facilities at Oswego and elsewhere, and to provide necessary additions to the rolling stock, will require additional expenditure of money, which the directors have concluded should be provided by sale of a portion of its assets.

"The proceeds of this sale will be used to hasten the completion of the road between Middletown and Weehawken, the necessity and importance of which has been long felt, and will leave the company free from debt. The directors believe it will enable the company to largely increase the earning capacity of the road.

"The directors have deemed it proper to dispose of such portion of the company's negotiable assets as may be necessary, in such way as to secure to the stockholders all the resulting benefits. They have decided to offer to the stockholders, in the manner hereinafter set forth, the $10,000,000 of the first-mortgage bonds of the New York West Shore & Buffalo Railroad Company owned by this company. The funds realized over and beyond the amounts required for the above purposes will be reserved for the further uses of the company."

The terms and conditions of sale to stockholders are as follows:

"Stockholders of record on Saturday, Aug. 5, 1882, will be entitled to subscribe for $1,000 of said New York West Shore & Buffalo Railroad Company's bonds at $500 per bond on each 60 shares of the New York, Ontario & Western stock of either class standing in their names. The right to subscribe as above may be assigned on blanks prepared for that purpose, which can be obtained upon application at the company's office. All rights to subscribe will cease on Aug. 14, 1882, at 3 p. m. Subscriptions will be due and payable as follows, namely: 25 per cent. of the purchase price at time of subscription, and the remainder, in instalments of not more than 10 per cent. for any one month, as called by the company, and on not less than ten days' notice. * * * Any portion of the bonds offered for subscription, not subscribed for and taken in accordance herewith, will be disposed of as the directors may hereafter determine."

New York, Pittsburgh & Chicago.—This company has bought from the Economite Society the Darlington Coal Railroad, extending from New Galilee, Pa., westward about six miles. It will be used as part of the main line.

New York, Susquehanna & Western.—The following circular is issued from this company's office, No. 93 Liberty street, New York, under date of Aug. 8:

"The Midland Railroad Company, of New Jersey, having been merged into and become a part of the New York, Susquehanna & Western Railroad Company, said company offer to the holders of the junior securities of the Midland Railroad Company, of New Jersey, the opportunity of exchanging their several securities into its common capital stock upon the following basis:

"Income bonds, class A, to be exchangeable into common stock dollar for dollar; income bonds, class B, to be exchangeable, at par, into the common stock, by the payment of 5 per cent. assessment thereon; scrip No. 1 to be exchangeable, at par, into the common stock, by the payment of 7½ per cent. assessment thereon; scrip No. 2 to be exchangeable, at par, into the common stock, by the payment of 10 per cent. assessment thereon.

"All holders of junior securities who are desirous of exchanging the same must present them at this office for that purpose on or before Sept. 15 next, after which date their right to make such conversion will cease and determine."

New York, West Shore & Buffalo.—Frequent inquiries are made as to the rate at which this new line is progressing. The following list of the working force from Weehawken to Middletown, and Cornwall to Syracuse will indicate the quantity of work which is being done:

Working force			17,640 men.
Steam and compressed air drills, 118, equal to			1,416 "
Steam excavations	14	"	1,400 "
Dredging machines	3	"	1,200 "
Total, equivalent to			21,656 men.

There are besides employed in the work 2,963 horses and carts, 30 locomotives, 995 cars, 19 pile-drivers, 69 steam derricks, 9 steam-pumps and 39 tugs, scows and canal boats.

Norfolk & Western.—The New River and East River roads having recently been consolidated, form now the New River Division of this road.

The whole line will be 75 miles from New River station Va., to Pocahontas. It is rapidly approaching completion, 15 miles of track being laid at present. The line will probably be opened for traffic in November. It is intended to open up the coal fields of Tazewell County, in which the coal is of the best coking and steam quality, mined from a 12 ft. vein. The opening of this line is expected to give to the Norfolk & Western a very large coal tonnage over its main line.

The New River Division is being built under the supervision of Mr. John Graham, Jr., as Chief Engineer.

Northern Pacific.—Grading has been finished on the Mouse River Branch from Jamestown, Dak., northward 40 miles, and tracklaying has been begun.

On the Little Falls Dakota Branch, track is now laid from Little Falls, Minn., west by south to Sauk Centre, 36 miles. The grading is finished from Sauk Centre to Morris, 50 miles, and tracklaying is in progress.

Oregon Railway & Navigation Co.—This company's statement for July, the first month of its fiscal year, is as follows:

Earnings	$425,300
Expenses	196,600
Net earnings	$228,700

As compared with July of last year, there was an increase of $7,885, or 1.9 per cent., in earnings; of $7,163, or 3.8 per cent., in expenses, and of $722, or 0.3 per cent., in net earnings.

Pemigewasset Valley.—The grading and masonry of this road are completed and tracklaying has been begun. The road is a branch of the Boston, Concord & Montreal, and will run from Plymouth, N. H., northward 20 miles through the White Mountain region.

Pennsylvania.—The branch from the Point of Rocks in Jersey City to Communipaw is being pushed rapidly. The road is built almost entirely on trestle work, crossing the streets in Jersey City by iron bridges with solid free-stone abutments. The railroad crosses the Central, of New Jersey, just east of the Communipaw station, and about 100 feet from the upper round house. The Pennsylvania Railroad purchased a large tract of land on the bay at this point several years ago, and erected a number of storehouses thereon; extensive docks will be built there, and another freight station will give the railroad new terminal facilities to be added to the already immense area occupied for their business.

Pittsburgh, Cleveland & Toledo.—This company has bought the franchises and whatever other property the Pittsburgh, Youngstown & Chicago Company may own in the projected line from New Castle, Pa., to Akron, O.

The company has resolved to issue $2,400,000 in bonds, for the purpose of completing and equipping the line.

Pittsburgh & Western.—This company will soon begin the construction of a passenger station 100 by 50 ft. in size in Allegheny, Pa. It will be of brick, three stories high, and will have rooms for the general officers of the company. A freight station will also be built on land adjoining.

Rochester & Pittsburgh.—The board has approved an issue of $5,000,000 new stock, and the question will be submitted to the stockholders at a special meeting. The new stock is to be used to purchase and retire $2,200,000 outstanding income bonds; to purchase the stock of the Perry Railroad Company, and of the Brookville & Punxsutawney Company.

St. Johnsbury & Lake Champlain.—At the annual meeting, Aug. 9, the stockholders voted to approve the lease of the new Canada Junction road, to be taken jointly with the Montreal, Portland & Boston Company.

St. Louis, Iron Mountain & Southern.—Articles have been filed with the Secretary of State of Arkansas providing for the building of a branch from Beebe, Ark., west to Fort Smith, about 160 miles

A suit has been begun by the Batesville & Brinkley (formerly the Cotton Plant), Railroad Company to enjoin this company from building its proposed branch from Newport, Ark., to Batesville. It is claimed that this branch will be parallel to the Batesville & Brinkley road, and less than ten miles distant from it, and that its construction will be an infringement on the franchise. The Iron Mountain Company claims the right to build the branch under the old Cairo & Fulton charter.

St. Paul & Duluth.—On Aug. 1 this company took possession of and will hereafter operate the road from Minneapolis to White Bear, formerly known as the Minneapolis & Duluth Railroad. The company will also take possession of the road from Wyoming to Taylor's Falls. Both of these lines were recently run by the Minneapolis & St. Louis Railway Company, which also used the track (under lease) of the St. Paul & Duluth to Duluth. Under the new arrangement the Minneapolis & St. Louis will have no further right to the use of the tracks of the St. Paul & Duluth. The latter company will run through trains from Minneapolis to Stillwater, as well as to White Bear, and continue its regular runs from St. Paul to those points. The Minneapolis & Duluth road, completed in 1871, was leased perpetually to the Minneapolis & St. Louis. The lease of the track of the St. Paul & Duluth to the Minneapolis & St. Louis was dated May 1, 1880, giving the right to use the track of the former from White bear to Duluth, 143 miles, to continue for three years and until notice. The branch line from Wyoming to Taylor's Falls, on the St. Croix River, is owned jointly by the two companies. As the Minneapolis & St. Louis is now under the control of the

Omaha line, which will have its own northern outlets, it does not require the St. Paul & Duluth tracks, so arrangements mutually satisfactory have been made by which all former contracts terminate.

Salt Lake & Western.—The track on this road is now laid to Tintic, Utah, 14 miles west of the late terminus at Boulder, and 54 miles from the junction with the Utah Central at Lehi. Trains are running regularly. The grading is completed about 10 miles beyond Tintic.

Silver City, Deming & Pacific.—A contract has been let to John Scott for the grading and masonry of this road, which is to extend from Deming, N. M., the junction of the Atchison, Topeka & Santa Fe and the Southern Pacific roads, to Silver City in Grant County, the centre of an important silver mining district. The distance is 46 miles, and the work is to be completed by December.

Sioux City & Pacific.—The Nebraska Division is now open for business to Thatcher, Neb., 50 miles west of Long Pine and 289 miles from the Missouri River. The new stations between Long Pine and Thatcher are Ainsworth, Johnston, Woodlake and Arabia.

Stockton & Amador.—An effort is being made to secure the construction of this road from Stockton, Cal., to Buena Vista in Amador County, a distance of 36 miles, through a rich country. An extension of 50 miles, from Buena Vista to the timber belt, is also proposed.

Texas-Mexican.—This company, in connection with the Mexican National, is now running Saturday excursions from Laredo and Neuva Laredo to Corpus Christi, returning on the following evening. The object is to educate the people in sea-coast recreations, and lay the foundations for pleasure travel over the road hereafter. The fare for the round trip from Laredo to Corpus Christi and return (324 miles) is $6.50, or about two cents a mile.

Texas & New Orleans.—This company's stockholders will meet next week to vote on the question of issuing new stock, at the rate of $25,000 per mile to pay for the branch from the main line at Beaumont to Woodville in Tyler County, Tex., known as the Sabine & East Texas road, and for its further extension from Woodville towards Marshall.

Texas & Pacific.—The House Judiciary Committee have directed their Chairman to report to the House a resolution declaring forfeiture of the lands granted by the United States to the Texas & Pacific Railroad Company on all that part of its original line (through New Mexico, Arizona and Southern California) which the company has not built upon. The report which accompanies the resolution shows that the road was to have been built from Marshall, Texas, near the thirty-second parallel, to El Paso; thence through New Mexico and Arizona, to a point on the Rio Colorado at or near the southern boundary of California and thence to San Diego. To connect the Texas & Pacific with San Francisco, the Southern Pacific Railroad of California was authorized to build a road to the Colorado River. The company was granted 20 alternate sections of land per mile on each side of the line through the territories and 10 alternate sections per mile on each side of the line in California. The land embraced in the grant is estimated at 14,309,760 acres. The time for completing the line was extended to May 2, 1882. After the completion of the Southern Pacific to El Paso it entered into an arrangement with the Texas & Pacific by which the latter company had released its title to the land grant to the Southern Pacific, and that that corporation is now the claimant of the lands. On behalf of the Southern Pacific, it is urged that the words used in the ninth section, "and assigns," in the phrase: "There is hereby granted to the said Texas & Pacific Railroad Company, its successors and assigns, every alternate section," etc., authorized the latter company to transfer the lands in question in bulk to any other person who would receive it charged with the same trust.

No action was taken on this report before the adjournment of Congress.

Texas & St. Louis.—On the Texas Division track is now laid to Leon River, 12 miles beyond the late terminus at McGregor, Tex., and 33 miles southwest from Waco. Work is progressing toward Gatesville.

On the line in Arkansas tracklaying is in progress from Jonesboro, the terminus of the continuous line, from Birds Point, from Clarendon, the White River crossing and from Pine Bluff, on the Arkansas River, southwest.

Trinity & Sabine.—This road is to be extended from the present terminus at Moscow, Tex., eastward 30 miles to Forin in Tyler County.

The road is controlled by the International & Great Northern, and will be worked as a branch of that road.

Union Pacific.—On the Oregon Short Line the grading is all done from the junction with the main line at Granger, Wy., west by north to Soda Springs, Idaho, 149 miles, and is nearly finished from Soda Springs to Portneuf, 66 miles. Track is laid 132 miles from Granger. From Portneuf to Pocatello the Utah & Northern track is used. From Pocatello westward track is laid to American Falls, 28 miles, and the grading is done for nearly 70 miles further.

Utah Central.—This company makes the following statement for June and the six months ending June 30:

	June.	Six months.
Gross earnings	$131,237	$774,543
Expenses	55,664	305,725
Net earnings	$75,573	$468,818
Six months interest on bonds	$1 6 605	
Dividend on stock, 3 per cent	126,750	
		293,355
Surplus for the half-year		$175,463

For the month of June the expenses were 42.43 per cent.; for the half-year they were 39.47 per cent. of gross earnings.

Virginia & Carolina.—The Richmond (Va.) *State* says: "The Supreme Court of Appeals of Virginia, sitting at Wytheville, has awarded a peremptory *mandamus* against P. H. McCaull, the keeper of the rolls, to compel him to publish among the laws passed at the last session of the Legislature an act incorporating the Virginia & Carolina Railroad Company. It will be remembered that this bill (known as Maj. P. A. Wellford's bill) was passed by both houses and sent to the Governor, and before its return, by a joint resolution, the Governor was requested to return the bill to the Legislature without acting upon it, which was done. The Court of Appeals held that the bill became a law, inasmuch as it had not been vetoed by the Governor within five days after it was sent to him, and that no action of the Legislature short of a repeal could abrogate the charter granted in the bill. The bill by this decision stands as one of the acts passed at the last session.

"The object of the charter was to build a road from Richmond through the counties of Chesterfield, Dinwiddie, Brunswick and Mecklenburg, to some point in North Carolina, on the line of the Raleigh & Gaston road. It is thought by sagacious railroad men in this city that Moncure Robinson is the power behind the throne. The *mandamus* from the Supreme Court made quite a flutter in stock circles here this morning."

Wheeling & Lake Erie.—The ballasting of the new sections of this road is nearly finished, and about Aug. 15 trains will begin to run through between Toledo, O., and Loar, connecting at the latter place for Marietta.

Work on the round-house and repair shops at Norwalk, O., is progressing well.

Wisconsin Central.—The following circular was issued July 31: "Notice is hereby given that the lease of the Milwaukee & Northern Railroad to John A. Stewart and Edwin H. Abbot, trustees in possession of the Wisconsin Central Railroad, terminates by agreement by midnight, July 31, 1882. The business, both passenger and freight, of the Wisconsin Central Railroad heretofore done over the Milwaukee & Northern Railroad will continue over that road until the completion of the Milwaukee & Lake Winnebago Railroad. All employés of the trustees of the Wisconsin Central Railroad engaged on the Milwaukee & Northern Railroad, if not specially retained, will consider their services at an end at the close of the month. All funds in the hands of agents belonging to the trustees of the Wisconsin Central Railroad will be remitted to the general office, as heretofore, and the General Freight Agent and General Passenger and Ticket Agent and Auditor will each instruct as to the closing up of their matters."

ANNUAL REPORTS.

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Ogdensb'g & L. Champlain	386
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Wisconsin Central	370

Chicago & Northwestern.

At the close of its twenty-third fiscal year, May 31, 1882, this company operated 3,278.22 miles of road, the statement of mileage by divisions being as follows:

	Miles.
Wisconsin Division, Chicago to Ft. Howard, and branches	555.26
Galena Division, Chicago to Clinton, and branches	313.14
Iowa Division, Clinton to Council Bluffs, and branches	622.04
Northern Iowa Division, Tama to Elmore, and branches	290.71
Madison Division, Belvidere to Winona, and branches	460.76
Peninsula Division, Ft. Howard to Lake Angeline Mine, and branches	291.24
Winona & St. Peter Division, Winona to Watertown, and branches	448.48
Dakota Division, Minnesota line to Pierre, and branch	296.59
Total mileage worked	3,278.22

Of this mileage 2,407.72 miles are laid with steel, leaving 870.50 miles of main track still laid with iron rails.

The equipment at the close of the last two years was as follows:

	1882.	1881.	Inc.
Locomotives	558	476	82
Passenger cars, first-class	206	178	28
" " second-class	29	29	....
Parlor and dining cars	13	7	6
Baggage, mail and express cars	117	113	4
Box cars	10,140	9,530	610
Stock cars	1,436	1,436	....
Platform and gondola cars	2,499	2,149	350
Iron ore cars	3,857	2,957	900
Caboose cars	244	172	72
Paymasters' and officers' cars	4	4	....
Boarding cars	18	18	....
Pile-driving and wrecking cars	22	15	7
Dump and ditching cars	65	65	....

The total at the close of last year was 365 passenger train cars, 18,176 freight cars and 109 service cars. The equipment per mile of road was 0.17 locomotive, 0.11 passenger-train car, 5.54 freight cars and 0.03 service car. The average number of cars per locomotive was 0.65 passenger-train car, 32.57 freight cars and 0.19 service car.

Of the total mileage 1,037.73 miles are owned by the company directly; 1,752.98 miles owned through the proprietary companies, and 487.57 miles leased.

The average mileage worked for the year was 3,032.90 miles, an increase of 388.74 miles over the average mileage of the previous year.

Of the whole line 500.15 miles were in Illinois, 895.84 in Wisconsin, 224.41 in Michigan, 912.75 in Iowa, 414 in Minnesota, and 331.07 miles in Dakota.

The miles of new railroad added during the year were 504.18, consisting of Toledo & Northwestern Railway, 207.32 miles; Chicago, Milwaukee & Northwestern Railway, 140.88 miles; Iowa Southwestern Railway, 51.81 miles; Menominee River Railroad, 16.69 miles, and Dakota Central Railway, 87.48 miles.

The Land Department report sales of 241,069 acres and 1,688 town lots for $883,126.91. Cash receipts during the year were $598,404.64 for cash sales and advance payments; $169,953.99 for deferred payments; $42,176.14 for interest; $9,660 for stumpage, etc., making a total of $820,194.77. A number of lots were also given by the company for churches, schools and other public buildings. At the close of the year there were 353,860 acres under contract, and the obligations held by the company under these contracts amounted to $777,030.25. The total amount of land not sold or under contract was 1,824,421 acres, whereof 970,186 acres were in Minnesota, 447,895 acres in Michigan, 326,211 acres in Wisconsin, and 80,129 in the Menominee River grant.

The emigration to Minnesota and Dakota has continued to increase during the year. The government free lands are being absorbed with constantly increasing rapidity, and the growth of the towns on the new lines of this company's railway in the state and territory named has been gratifying. The towns on the recently constructed roads of the company in Iowa are exhibiting a substantial growth and prosperity. There has been, during the last year, a growing demand for the valuable timber lands of the company in Michigan and Wisconsin, and fair prices have been realized for such as have been sold.

The general balance sheet is as follows:

Liabilities.

Capital stocks:		
Common stock and scrip	$15,117,655.97	
Less owned by Co	21,731.60	
		$15,095,924.37
Preferred stock and scrip	$22,210,844.56	
Less owned by Co.	57,725.84	
		22,153,118.72
		$37,249,043.09
Proprietary roads:		
Chicago, Milwaukee & Northwestern		8,690,000.00
Consolidation Coal Co.		500,000.00
Dakota Central		550,000 00
Elgin & State Line		1,080,900.00
Escanaba & Lake Superior		6,250.00
Iowa Midland		50,000.00
Iowa Railway, Coal & Manufacturing Co		60,000.00
Iowa Southwestern		1,500,000.00
Menominee River		216,000.00
Rock River		75,000.00
Stanwood & Tipton		5,000.00
Toledo & Northwestern		8,125,000 00
Winona & St. Peter		2,300,000 00
Western Town Lot Co		25,000.00
		$60,132,193.09
Total bonded indebtedness		$64,248,000 00
Bonds purchased with proceeds of Winona & St. Peter land grant		366,000.00
Sinking funds paid:		
Madison Extension bonds	$115,000.00	
Menominee " "	100,000.00	
General consolidated "	911,000.00	
N. W. Union "	90,000.00	
W. & St. P. "	115,000.00	
		1,321,000.00
General consolidated gold bonds unsold		407,000.00
Material, fuel and steel rail bills for May		1,309,491.03
Pay-rolls for May		831,819 61
Uncollected coupons, old dividends, etc		74,829.85
Accrued interest, not yet due		675,430.00
Dividends declared, not yet due		971,184.50
Accrued rental of roads in Iowa, not yet due		439,934.80
Balance due to sundry railroad companies		4,098.47
Notes and mortgages (running through several years) on real estate, coal lands, new station, grounds, etc		404,774.10
Land income		689,534.28
Income account, surplus		7,264,581.51
Total		$139,139,871.24

Assets.

Road and equipment:		
Chicago & Northwestern	$76,739,549.47	
Chicago, Milwaukee & Northwestern Ry	17,571,735.04	
Consolidation Coal Co	779,687.08	
Dakota Central	4,442,860.15	
Elgin & State Line	1,080,900.00	
Escanaba & Lake Superior	438,922.76	
Iowa Midland	1,400,000.00	
Iowa Railway, Coal & Manufacturing Co	60,000.00	
Iowa Southwestern	2,214,937.77	
Menominee River	1,370,218.17	
Rock River	165,000.00	
Stanwood & Tipton	125,000.00	
Toledo & Northwestern	12,591,897.50	
Winona & St. Peter	12,380,000.00	
Western Town Lot Co	55,362.88	
		$131,419,070.82
Trustees of sinking funds:		
Farmers' Loan and Trust Company, Trustee	$420,000.00	
Union Trust Company, Trustee	901,000.00	
		1,321,000.00
General Assets:		
Consolidated sinking fund currency bonds on hand	$421,000.00	
General consolidated gold bonds on hand	407,000.00	
Winona & St. Peter Extension bonds on hand	600.00	
		$828,600.00
Cost of securities of sundry proprietary companies		37,219.31
Outside real estate in Chicago, (taken on account of Chicago fire)		200,000.00
Material and fuel on hand		2,291,340.46
Due from express companies		11,001.84
Due from United States government		77,235.37
Due from agents and others, being earnings in course of collection		1,076,295.70
Due from various persons		50,825.56
Bills receivable		66,674.16
Cash		1,760,608.02
		$6,390,800.42
Total		$139,139,871.24

Changes in stock during the year were the issue of $500,000 preferred stock in exchange for an equal amount of La Crosse, Trempealeau & Prescott stock, and of $2,500 preferred and $2,500 common stock for conversion of Peninsula Railroad bonds.

The changes in bonded debt were as follows:

Sinking fund 5 per cent. bonds issued on 345 miles of new road		$5,175,000
Escanaba & Lake Superior bonds, guaranteed		720,000
Dakota Central bonds, guaranteed		300,000
Chi., Mil. & Northwestern bonds, guaranteed		450,000
Des Moines & Minn bonds, guaranteed		600,000
Consolidated bonds issued to replace old bonds		1,668,000
Total new issues		$8,913,000
Less Galena & Chicago Union bonds retired	$1,605,000	
Less other old mortgage bonds retired	66,000	
		1,671,000
Net increase of bonded debt		$7,242,000

The total bonded debt on May 31, including live bonds in the various sinking funds, was $64,248,000, the annual interest charge on which was $4,288,130, or $1,308 per mile of road worked.

The train movement for the year was as follows:

Train miles:	1881-82.	1880-81.	Inc. or Dec.	P.c.
Passenger	3,999,677	3,354,170	I. 645,507	19.2
Freight	9,003,377	7,424,118	I. 1,579,259	21.3
Service	1,245,601	1,313,359	D. 67,758	5.2
Switching	3,908,602	3,209,507	I. 699,095	21.8
Total	18,157,257	15,301,154	I. 2,856,103	18.7
Car miles:				
Passenger-train	19,801,642	16,222,257	I. 3,579,385	22.1
Freight	194,547,302	152,347,391	I. 42,199,911	27.7
Average train:				
Pass. cars	5.23	4.84	I. 0.39	8.1
Freight cars	24.02	20.52	I. 3.50	17.1
Av. train load:				
Passengers, No.	54.67	48.99	I. 5 68	17 6
Freight, tons	147.21	132.07	I. 15.14	11.5

Locomotive service cost 20.51 cents per mile run, against 19.25 cents the previous year. The average earnings per passenger train mile were $1.61; expenses, $0.69; net earnings, $0.92; per freight train mile, earnings, $2.18; expenses, $1.24; net earnings, $0.94. The average earnings per mile for all trains were $2.00; expenses, $1.07; net earnings, $0.93. The average distance run by each passenger train was 59.10 miles; by each freight train, 65.69 miles. The average number of trains run on each working day was 203.29 passenger and 393.89 freight, a total of 597.18 trains per day.

The traffic for the year was as follows:

	1881-82.	1880-81.	In. or Dec.	P c.
Passengers carried	6,754,717	4,482,317	I. 2,272,400	50.7
Passenger-miles	205,574,178	164,333,508	I. 41,240,670	25.1
Tons freight carried	8,190,893	6,662,112	I. 1,528,781	22.9
Ton-miles	1,192,188,039	980,522,774	I. 211,665,265	21.6
Av. receipt:				
Per pass.-mile	2.52 cts.	2.53 cts.	D. 0.01 ct.	0.4
Per ton-mile	1.47 cts.	1.47 cts.	.. ....	..

The average passenger journey was 30.43 miles; the average freight haul, 145.55 miles.

The revenue derived from transportation of construction material at nominal rates for the new proprietary lines was $203,222.61, being 1.16 per cent. of the entire freight earnings for the year.

The earnings of the road were as follows:

	1881-82.	1880-81.	Increase.	P.c.
Freight	$17,525,134	$14,414,157	$3,110,983	21.6
Passengers	5,171,423	4,158,130	1,013,293	24.4
Express	361,548	310,233	51,315	16.5
Mail	431,584	297,380	134,204	45.2
Miscellaneous	194,967	154,178	40,789	26.5
Total	$23,684,656	$19,334,072	$4,350,584	22.5
Expenses	12,117,076	9,979,620	2,137,456	21.4
Taxes	522,558	446,201	76,357	17.1
Total	$12,639,634	$10,425,821	$2,213,813	21.2
Net earnings	$11,045,022	$8,908,251	$2,136,771	24.0
Gross earn. per mile	7,809	7,312	497	6.8
Net " "	3,642	3,369	273	8.1
Per cent. of exps	53.37	53.92	....	....

There was a very large increase both in gross and net earnings.

The following table shows the average mileage worked and the earnings per mile, etc., for six years past:

	Miles operated.	Earnings per mile.	Per cent. of expenses and taxes.	Net earnings per mile.
1877	1,993.28	$6,538 52	57.75	$2,762 78
1878	2,036.98	7,241 63	51.66	3,500 33
1879	2,129.37	6,847 53	58.86	3,227 84
1880	2,215.83	7,829 73	48.60	4,024 56
1881	2,644.16	7,311 99	53.92	3,369 03
1882	3,032.90	7,809 24	53.37	3,641 73
Average for six years		$7,263 11	.....	$3,421 04

The net earnings per mile, though larger than those of last year, are less than in 1880, when over 800 miles less road were worked.

The income account for the year is as follows, somewhat condensed:

Net earnings, as above		$11,045,022 08
Interest on bonds	$3,999,208.94	
Rental of leased roads	1,569,618.00	
Sinking funds	98,120.00	
Dividends on preferred stock	1,605,820.25	
" " common "	980,817.50	
		8,253,584.69
Surplus for the year		$2,791,437.39
Balance of income, May 31, 1881	$7,533,987.51	
Less reduction of nominal assets	3,060,843.39	
		4,473,144.12
Balance of income, May 31, 1882		$7,264,581.57

Dividends paid were three of 1¾ per cent. each and one of two per cent. on preferred stock; one of 3 and one 3½ per cent. on common stock.

A number of new buildings were erected during the year, the principal ones being at the West Chicago and Escanaba shops.

There were 35 iron bridges, seven Howe-truss spans and eight stone arches built to replace old wooden structures. A large number of pile and trestle bridges were rebuilt, and others replaced by culverts and solid filling.

The expenditures for new construction were $1,616,181.64, the chief items being for 34.79 miles new sidings, for new second tracks and spans and for the reconstruction of the Des Moines & Minneapolis road.

Of the amount charged off to income as reduction of nominal assets, the sum of $2,045,693.24 was in old construction accounts charged against the proprietary lines, and $1,015,150.15 in cost of securities of the proprietary lines, making a total of $3,060,843.39 reduction in nominal value of assets.

The following extracts are made from the report of Mr. Albert Keep, President of the company:

ROADWAY AND TRACK.

"The expenditures for maintenance of road, including renewals, repairs, etc., amounted to $2,645,846.47, and, with repairs of bridges, to $3,086,255.17 on the 3,032.90 miles operated. This gives a little more than $1,000 per mile as the average amount expended on each mile of road operated, although it is obvious that much the largest share of this expense devolved on the older lines, where the greatest traffic prevailed.

"The extent and cost of maintenance will more definitely appear in the following items embraced in this account, viz.: 23,414.22 tons of new steel rails, equal to 248.33 miles of track; 373.49 tons of re-rolled iron rails, equal to 4.75 miles; 34.091 iron and steel rails repaired at rail mills, equal to 63.30 miles, making a total of 316.38 miles of track renewed, at a cost for these items of $1,399,601.19.

"The further sum of $397,089.36 was expended for cross ties laid in track, and for switch and bridge ties. The number used was 914,896, which is equal to 326.75 miles renewed with ties, at the average cost in the track of 43.40 cents each; $344,521.50 was paid for ballasting, improvement of grades, ditching, drainage, rail fastenings and switches, including 21,938 standard splice bars, 137,692 angle bars, 375,260 nut locks, 2,111 kegs of bolts, 6,306 kegs of spikes and 189 switches.

"The miles of road laid with steel rails on May 31, last, were 2,407.72, being an increase of 641.54 miles during the year.

EQUIPMENT.

"Upwards of four millions of dollars have been expended for equipment during the last two years, to meet the demands of increased traffic and for furnishing the new lines. On May 31, the whole number of locomotive engines was 558, and the number of cars 18,650, being an increase of 82 engines and 1,977 cars since the last report. The car equipment was increased by 28 passenger cars, 4 parlor cars, 2 dining cars, 4 baggage and express cars, 72 caboose cars, 610 box freight cars, 100 platform cars, 900 iron ore cars, 250 gondola coal cars, and 7 pile-driving and wrecking cars. The expenditure on account of new rolling stock amounted to $1,868,466.88 for the year. Besides these additions, 5 passenger cars, 2 baggage cars, 89 box freight cars, 77 live stock cars, 155 platform cars, 3 caboose cars and 6 locomotive engines were rebuilt in the shops; 20 tender frames, 32 cabs, 14 cylinders, 214 steel tires, 23 driving wheels, 22 driving axles, 2,793 new truck and tender wheels, 770 truck and tender axles, 8,712 car wheels, 2,132 car axles and other important and expensive renewals were made, and embraced in the cost of repairs of engines and cars, to maintain the rolling stock in its fullest efficiency."

NEW CONSTRUCTION.

"The construction referred to above is exclusive of the net balance of $5,502,838.73 expended for new railroads, coal property, lands and grounds laid out at stations and town sites along the newly completed lines, and of $1,868,466.88 expended for additional equipment as heretofore stated.

"Of the new roads in progress at date of the last annual report, the Iowa Southwestern was completed during the last year. This branch connects with the main Iowa line at Carroll, extends southwesterly to the town of Kirkman, with an arm to Audubon, in all a distance of 51.81 miles, and traverses a rich, productive and well cultivated portion of the state.

"The more important line of the Toledo & Northwestern Railway in Central and Northwestern Iowa is rapidly approaching completion. This road, now in the third year of its construction, connects with the main line of the Chicago & Northwestern Company at Tama, 270 miles west of Chicago, and runs northwesterly and northerly to Elmore, at the Minnesota state line, 164.5 miles, with a westerly branch from Jewell Junction to Lake City, 58.1 miles, and another branch running westerly from Eagle Grove to Calliope, on the boundary line between Iowa and Southeastern Dakota a distance of 144 miles. The whole length of road is 366.6 miles, of which 290.6 miles are finished, and the residue, 76 miles, will be completed by Oct. 1 next.

"The Des Moines & Minneapolis Railway, formerly a narrow-gauge line running north from Des Moines to Callanan, 58 miles, acquired under perpetual lease, and since by ownership of its stock, has been entirely re-constructed to standard gauge and laid with steel rails. A connecting link of 2.4 miles has been built from Callanan to a connection with the Toledo & Northwestern Railway at Jewell Junction, thus forming a continuous north and south line between Des Moines and Elmore, at the north line of the state, a distance of 155 miles, where a connection is made with the Blue Earth Branch of the Chicago, St. Paul, Minneapolis & Omaha Road to Mankato, the Minneapolis & Saint Louis, and with the Winona & Saint Peter at Kasota Junction, opposite Saint Peter. The business and facilities of this line will be largely increased by its change of gauge, and by the important connections thus secured in Iowa and Minnesota.

"In Dakota, the Sioux Valley Branch of the Dakota Central road was mostly graded before the close of the year, and at the date of issuing this report all the track laying but about four miles is completed. The line is 30.8 miles in length, and will be fully completed by Aug. 1.

"An extension from the terminus of the Winona & St. Peter Railroad at Watertown, Dak., is in progress to connect that line with the James River Branch of the Dakota Central at Redfield, a distance of 71 miles; the grading on this line is well advanced, a portion of the track finished, and the road will be completed during the present season.

"In the iron districts of Michigan the Escanaba & Lake Superior Railway, which was commenced last year, is in progress and a portion of the track laid. It is expected that this branch of 36 miles, connecting with the Peninsula Division, will be ready for operation, and admit of ore shipments to Escanaba harbor during the present season of lake navigation.

"An extension of the Menominee River Railroad from its present western terminus to the iron deposits in the vicinity of Crystal Falls is nearly completed, and a further extension of about 20 miles is under construction to the Iron River district, with the expectation of finishing the line by Oct. 1 next.

"A grain elevator of large capacity, built in the interest of the roads terminating at Council Bluffs, was completed during the year at that point, and its facilities for storage and transfer of grain will supply a want which has long been felt in the interchange of business between the Iowa companies and the Union Pacific road.

"For the greater convenience and expedition of general traffic and suburban trains, the company is extending its second main track on the Milwaukee Division to Evanston, a distance of 13.1 miles, and on the Wisconsin Division to Montrose, a distance of 7.6 miles from Chicago.

"The new passenger depot at Chicago, which was completed and put to use at the beginning of the fiscal year, has proved to be convenient and ample for the present traffic, and adds materially to the comfort and accommodation of the traveling public.

CONSOLIDATION.

"Mention was made in the last annual report of various consolidations of proprietary lines in the different states, in anticipation of such further action towards consolidating with the Chicago & Northwestern Railway Company, as might be deemed advisable from time to time in future. At the last annual meeting in Chicago, articles of consolidation were submitted between this company, the Escanaba & Lake Superior and the Menominee River Railroad companies, in Michigan, whose stocks and properties are wholly owned by this company, and resolutions approving and affirming such consolidation on the part of this company were then passed.

"To complete the merger of these companies, in accordance with the statutes of the state of Michigan, the stock holders' meeting adjourned to meet at Escanaba, Michigan, Sept. 14 next, when the Michigan companies will formally ratify and confirm the proceedings authorized at the annual meeting in June last.

GENERAL REMARKS.

"The completion of the various lines heretofore mentioned will materially abate the large amount of construction expenditures which have been so freely and beneficially made during the last five years for the extension and improvement of the property. At the beginning of this period, and for the year ending May 31, 1877, the company operated 1,993.28 miles of railroad, and earned $13,033,101.96, while during the year just closed, it operated 3,032.90 miles, and earned $23,684,656.19, being an increase in railroad of 1,039.62 miles, or 52.15 per cent., and an increase in gross earnings of $10,651,554.23, or 81.72 per cent. within that period.

"A large share of this additional mileage lies in the sparsely settled or wholly new agricultural regions of Minnesota, Iowa and Dakota, which will require considerable time to be brought under profitable cultivation, and to furnish a large amount of surplus products for railroad transportation. The growth, however, has been more rapid than could have been anticipated, and within the last year the amount of emigration and extent of settlement and cultivation have been immensely increased.

"By reference to the Land Commissioner's statements it will be seen that a larger quantity of the land-grant lands has been sold than in any previous year, both of prairie lands for agricultural purposes in the Northwest, and of forest lands for timber in Wisconsin and Michigan.

"In view of the comparatively light crop of cereals last year, considerable anxiety has been felt for the outcome of the present year's harvest. At the time of issuing this report the prospect for a bountiful yield of wheat and other small grains is most encouraging, while corn, though less promising, is rapidly improving, and with the continuance of favorable weather, a fair crop may be secured. In this connection it may be stated that the proportion of earnings derived from the transportation of wheat and flour for the year ending May 31, 1881, was 14.16 per cent. of the freight earnings, and in the last year, 9.417 per cent. Of corn, in the year 1880-81, it was 7.439 per cent., and in the last year, 9.997 per cent.—the latter being the movement of the abundant crop of 1880 during the summer of 1881, which is included in the present fiscal year, and contributed largely to the earnings of last summer. Of other small grains, rye, oats and barley, the proportion for the same years was, in 1880-81, 4.358 per cent., and in the last fiscal year, 3.376 per cent.

"While it cannot be expected that the unusual increase of gross earnings during the last year—being 22½ per cent. of the entire revenue, including 24.37 per cent. in passenger earnings, and 21.58 per cent. in freight earnings—can be continued in corresponding ratio in future, yet it is confidently believed that the business of the company will, in times of ordinary prosperity, show a favorable yearly increase."

Mobile & Ohio.

The following preliminary statement is issued in anticipation of the full annual report. The earnings and expenses are subject to slight corrections.

The earnings for the year ending June 30 were as follows:

	1881-82.	1880-81.	Inc. or Dec.	P. c.
Freight	$1,617,767	$1,791,503	D. $173,736	9.7
Passage	402,436	416,127	D. 13,691	3.3
Mail, etc	142,894	170,187	D. 27,293	16.1
Total	$2,163,097	$2,377,817	D. $214,720	9.0
Expenses	1,601,054	1,562,486	I. 38,568	2.5
Net earnings	$562,043	$815,331	D. $253,288	31.1
Gross earn. per mile	4,184	4,699	D. 515	10.9
Net " "	1,087	1,611	D. 524	32.8
Per cent. of exps	74.0	65.7	I. 8.3	....

The Cairo Extension was operated from Jan. 1, 1882, making the average mileage 517 miles, against 506 miles in the previous year.

The income account was as follows:

Balance from previous year		$2,797
Net earnings, as above		562,043
Total		$564,840
Interest on first-mortgage bonds	$420,600	
" " Cairo Extension bonds	36,000	
		456,000
Surplus for debentures		$108,840

The board of directors has ordered the payment of interest at the rate of of 2 per cent upon the first-preferred income and sinking fund debentures, payable to the registered holders thereof, 1 per cent Sept. 1, 1882, the transfer books to close Aug. 19, and 1 per cent Feb. 1 next, the transfer books to close Jan 20, 1883.

The general statement of Mr. W. B. Duncan, President, says: "The decrease in gross receipts may be chiefly attributed to the fact that the cotton crop, on which the prosperity of the country tributary to the road largely depends, was so deficient as to render local business abnormally small, while the through traffic, an important factor during winter and early spring, became virtually suspended by reason of the serious damage done to connecting roads by the unprecedented freshets of the Mississippi and Ohio rivers. The increase in gross expenses is due to the higher cost of rails, fuel and materials generally—to a slight increase in the cost of labor, and, since Jan. 1, to the repair and maintenance of 22 additional miles of track; during the year much material was transported for the construction of these 22 miles (Cairo Extension), for which no charge was made, and from which consequently no revenue was derived."

Memphis & Charleston.

This road, which is worked by the East Tennessee, Virginia & Georgia Company under lease, extends from Memphis, Tenn., to Stevenson, Ala., 272 miles, with 20 miles of branches. Its trains run over the Nashville, Chattanooga & St. Louis track from Stevenson to Chattanooga, 38 miles.

The following statement of earnings for the year ending June 30 is published:

	1881-82.	1880-81.	Inc. or Dec.	P. c.
Earnings	$1,323,614	$1,294,415	I. $29,198	2.3
Expenses	1,040,000	1,327,499	D. 287,499	21.7
Net earnings	$283,614	.....	.. ..	.....
Deficit	.....	$33,083	.. ..	.....
Gross earn. per mile	4,533	4,433	I. $100	2.3
Net " "	971	.....	.. ..	.....
Per cent. of exps	78.57	102.56	D. 23.99	.....

The fixed charges, interest and rentals, last year were $294,000, showing a deficit on the lease of $10,386 for the year.

The expenses in 1880-81 included $556,423 for new steel rails, new equipment and other extraordinary expenses. If these were deducted, the net earnings would have been $523,339. The expenses last year also included heavy renewals,